

## The Gelechiidae (Lepidoptera) of the Galapagos Islands, Ecuador, a taxonomic revision

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**The Gelechiidae (Lepidoptera) of the Galapagos Islands, Ecuador, a taxonomic revision.** - The Gelechiidae of the Galapagos Islands are revised. Twenty-two species are recognized to be established on the archipelago, including eight described as new: *Ephysteris sporobolella* Landry (bred from *Sporobolus virginicus* (L.) Kunth (Poaceae)), *E. scimitarella* Landry, *Scrobipalpula inornata* Landry, *S. equatoriella* Landry, *S. caustoniae* Landry, *Stegasta francisci* Landry, *Symmetrischema escondidella* Landry, and *Untomia lunatella* Landry. *Agnippe omphalopa* (Meyrick, 1917), comb. n., *Anacampsis primigenia* Meyrick, 1918, *Aristotelia sarcodes* Walsingham, 1910, *Compsolechia salebrosa* Meyrick, 1918, *Dichomeris acuminatus* (Staudinger, 1876), *Ephysteris subdiminutella* (Stainton, 1867), *Mesophleps adustipennis* (Walsingham, 1897) comb. n., *Phthorimaea perfidiosa* Meyrick, 1917, *Scrobipalpula densata* (Meyrick, 1917), and *Stegasta zygotoma* Meyrick, 1917 are reported from the archipelago for the first time. Four additional species had been reported from the archipelago before. A lectotype is designated for *Echinoglossa trinota* Clarke, 1965 from Masatierra, Juan Fernandez Islands. New host plant records are provided for *A. omphalopa*, *A. primigenia*, *C. salebrosa*, *M. adustipennis*, and *P. absoluta*.

**Keywords:** Microlepidoptera - Gelechioidea - Gelechiinae - Anomologini - Anacampsinini - Gelechiini - Gnorimoschemini - Litini - Dichomeridinae - Pexicopiinae - host plants - Neotropical Region.

### INTRODUCTION

The Gelechiidae are a very large family of microlepidoptera within the hyper diverse Gelechioidea. More than 4,530 species have been described (Hodges, 1998), and whilst 855 have been reported from the Neotropical Region (Heppner, 1991), their diversity in this region far exceeds this number.

Gelechiidae were first reported from the Galapagos Islands by Schaus (1923). However, both of the species mentioned by Schaus are believed to represent erroneous records as mentioned by Schmitz & Landry (2007). The unique specimen of *Aristotelia howardi* Walsingham, 1909 recorded by Schaus from South Seymour is believed to be

the species described three years later by Meyrick as *Aristotelia naxia* Meyrick, even though *A. howardi*, described from Mexico, is paler and with different forewing markings, especially on apical third (see [http://www.sil.si.edu/DigitalCollections/bca/navigation/bca\\_15\\_04\\_00/bca\\_15\\_04\\_00plates.cfm](http://www.sil.si.edu/DigitalCollections/bca/navigation/bca_15_04_00/bca_15_04_00plates.cfm)). No other species of Gelechiidae are more similar to *A. howardi* than *A. naxia* in the Galapagos. *Gelechia bosqueella* Chambers, 1875, (now in *Stegasta* Meyrick) was reported by Schaus from one specimen collected at Conway Bay, Indefatigable (now Santa Cruz). This record is believed to represent *Stegasta zygotoma* Meyrick, 1917.

Following Schaus, Meyrick (1926) recorded three species of Gelechiidae from the Galapagos, all of which he described as new. Two of these were transferred to the Autostichidae genus *Galagete* Landry (Landry, 2002) while the third is *Aristotelia naxia*. The five taxa mentioned by Schaus and Meyrick were listed by Linsley & Usinger (1966) and *A. naxia* was mentioned again by Linsley (1977).

*Stoeberhinus testaceus* Butler, 1881, was recorded as a Gelechiidae 'supposedly also in the Galapagos' by Zimmerman (1978: 1806), but the origin of this supposition was not found. Perhaps it comes from Meyrick (1927) who recorded it from several Pacific islands and added 'apparently throughout the Pacific Islands'. The species was then positively recorded from the archipelago by Clarke (1986: 171). However, it was not mentioned by Schaus (1923) and Meyrick (1926), nor was it listed by Linsley & Usinger (1966) and Linsley (1977), nor is it represented by Galapagos specimens in the BMNH. We conclude that it is not present yet in the Galapagos Islands. This taxon was also moved to the Autostichidae (see Hodges, 1998).

The next and last previous records of Gelechiidae on the Galapagos are those of *Sitotroga cerealella* (Olivier, 1789) and *Phthorimaea absoluta* Meyrick, 1917, (as *Tuta absoluta*) in Causton *et al.* (2006), and the description of *Chionodes stefaniae* by Schmitz & Landry (2007). Thus, only four valid species of Gelechiidae have been reported so far from Galapagos. Below we report another 18 species, 8 of which are described as new. These 22 Galapagos species of Gelechiidae are listed in a check-list following the conclusion. Two additional species (Figs 39, 40, 101, 102) of Gnorimoschemini, known from only three female specimens altogether (MHNG), are not taxonomically treated here because of the lack of material.

## MATERIAL AND METHODS

The manner of giving the label data of the holotypes and paratypes is presented in Landry (2006) as are the methods used for specimen collecting. Most of the material forming the basis of this study was collected by ourselves at light, but we also reared some of the species. This material is mostly deposited in the Charles Darwin Research Station, Santa Cruz Islands, Galapagos, Ecuador (CDRS), Canadian National Collection of Insects, Ottawa, Canada (CNC), and Muséum d'histoire naturelle, Geneva, Switzerland (MHNG), which also includes specimens collected between 2004 and 2006 by P. Schmitz. We also studied older material from the Natural History Museum, London, UK (BMNH), the California Academy of Sciences, San Francisco (CAS), and the National Museum of Natural History, Washington, DC, USA (USNM). The host plant nomenclature follows Lawesson *et al.* (1987) and the information on island sizes comes from Peck (2001).

The previously described species are given additional descriptions of the sex and parts that were not treated in the original descriptions or elsewhere. The material examined for these species is given in alphabetical order of islands and within each island in increasing order of elevation, but the collector names and collecting dates are omitted.

The terminology of the genitalia generally follows Kristensen (2003), but the names of two of the male genital structures in Gnorimoschemini (parabasal process, sacculus processes) are from Povolný (e.g. 1999, 2002). The male genital illustrations for each species are at the same scale when the phallus is illustrated separately from the rest of the genitalia. However, the male and female genitalia of different species on each plate are not to scale, as in the illustrations of the moths.

### Systematic check-list of Galapagos Gelechiidae

#### Gelechiinae, Anomologini

*Aristotelia naxia* Meyrick, 1926

*Aristotelia sarcodes* Walsingham, 1910

#### Gelechiinae, Gelechiini

*Chionodes stefaniae* Schmitz & Landry, 2007

*Stegasta zygotoma* Meyrick, 1917

*Stegasta francisci* Landry, sp. n.

#### Gelechiinae, Gnorimoschemini

*Ephysteris scimitarella* Landry, sp. n.

*Ephysteris sporobolella* Landry, sp. n.

*Ephysteris subdiminutella* (Stainton, 1867)

*Phthorimaea absoluta* Meyrick, 1917

*Phthorimaea perfidiosa* Meyrick, 1917

*Scrobipalpula densata* (Meyrick, 1917)

*Scrobipalpula equatoriella* Landry, sp. n.

*Scrobipalpula inornata* Landry, sp. n.

*Symmetrischema caustonae* Landry, sp. n.

*Symmetrischema escondidella* Landry, sp. n.

#### Gelechiinae, Litini

*Agnippe omphalopa* (Meyrick, 1917), comb. n.

#### Gelechiinae, Anacampsini

*Anacampsis primigenia* Meyrick, 1918

*Compsolechia salebrosa* Meyrick, 1918

*Mesophleps adustipennis* (Walsingham, 1897), comb. n.

*Untomia lunatella* Landry, sp. n.

#### Pexicopiinae

*Sitotroga cerealella* (Olivier, 1789)

#### Dichomeridinae

*Dichomeris acuminatus* (Staudinger, 1876)

## SYSTEMATIC PART

**Gelechiinae**  
**Anomologini***Aristotelia* Hübner, [1825]

A large and widespread genus containing 35 species in the Nearctic region (Lee et al., 2009), 42 in the Neotropics (Becker, 1984), and 14 in Europe (Karsholt & Riedl, 1996), for example. Meyrick (1925) provided a World list of 238 species, but his concept of the genus was much broader than today's. Beccaloni *et al.* (2003) list 149 names, including synonyms. In the Galapagos two species occur, but their host plants are unknown. Other species of *Aristotelia* have been reared from a wide range of host plant families such as Asteraceae, Euphorbiaceae, Fabaceae, Polygonaceae, Rosaceae, Solanaceae, etc. (see Robinson *et al.*, 2007).

*Aristotelia naxia* Meyrick, 1926

Figs 1, 41, 42, 80–82

*Aristotelia naxia* Meyrick, 1926: 277. – Linsley & Usinger, 1966: 164. – Linsley, 1977: 37. – Becker, 1984: 45.

MATERIAL EXAMINED: 28 ♂, 35 ♀. Male holotype, described from Charles [Florea] Island, and collected in July [labels and dissection number not recorded] (BMNH). – *Espanola*: bahia Manzanillo. – *Fernandina*: SW side, crater rim, 1341 m elev., S 00° 21.910' W 091° 34.034'. – *Floreana*: Las Cuevas; Punta Cormoran; close to Loberia, 6 m elev. – *Genovesa*: bahia Darwin. – *Isabela, Alcedo*: lado NE, playa; NE slope, near shore, 9 m elev., S 00° 23.619' W 90° 59.715'; lado NE, low arid zone; lado Este, 700 m elev. – *Isabela, Darwin*: Tagus Cove; 200 m elev.; [W slope] 300 m elev.; [W slope] 630 m elev. – *Isabela, Sierra Negra*: 2 km W Puerto Villamil; 8.5 km N Puerto Villamil. – *Marchena*: no specified locality. – *Pinta*: playa Ibbetson, N 00° 32.819' W 90° 44.229'; ±15 m elev.; ±50 m elev.; ±200 m elev.; ±400 m elev. – *Pinzon*: playa Escondida, 00° 35.928' W 90° 39.291'. – *Rabida*: tourist trail. – *San Cristobal*: Puerto Baquerizo; near Loberia, 14 m elev., S 00° 55.149' W 89° 36.897'; 2 km SW Puerto Baquerizo; 4 km SE Puerto Baquerizo; base of Cerro Pelado; 1 km S El Progreso. – *Santa Cruz*: bahia Conway; Charles Darwin Research Station; 2 km W Bella Vista; transition zone, house of L. Roque, 137 m elev., S 00° 42.595' W 90° 19.196'; transition zone, recently cut road, S 00° 42.528' W 90° 18.849'; finca Steve Devine; finca Vilema, 2 km W Bella Vista; Los Gemelos. – *Santiago*: Bahía Espumilla; La Bomba, 6 m elev., S 00° 11.151' W 90° 42.052'; N side, 147 m elev., S 00° 12.186' W 90° 42.888'; 200 m elev.; Cerro Inn; Aguacate, 520 m elev. – *Seymour Norte*: 13 m elev., S 00° 24.013' W 90° 17.422'; [no specified locality]. Deposited in BMNH, CDRS, CNC, and MHNG.

DIAGNOSIS: Among the Gelechiidae of the Galapagos, the forewing pattern of *A. naxia* with dark brown markings over a grey background will separate it immediately from all other species. The subbasal outwardly oblique bar, the median, incomplete V, the often complete band at 2/3, and the costal preapical spot are diagnostic. The most similar gelechiid species in the Galapagos would be the smaller (max. 11 mm wingspan) *Stegasta zygotoma* Meyrick and *S. francisci* sp. n. (Figs 5, 6) which also have paler markings, especially in the form of a large triangle at the base of the inner margin, and a subapical costal spot. *Aristotelia naxia* is similar to *A. roseosuffusella* (Clemens, 1860), described from Pennsylvania, USA, but the forewing of the latter has a salmon anal triangle, a white streak below apex, and a triangular streak subapically on costa. *Aristotelia psoraleae* Braun, 1930, has forewing markings similar to those of *A. roseosuffusella*. *Aristotelia cynthia* Meyrick, 1917, has forewing markings similar to those of *A. naxia*, but the male genitalia have widely differently shaped valvae and

uncus (See Clarke, 1969a: 283). Lastly, *A. perfossa* Meyrick, 1917 also has forewing markings similar to those of *A. naxia*, although not as contrasted, but the phallus is more simple and the uncus and valvae are shorter and not as sharply pointed apically (See Clarke, 1969a: 299).

ADDITIONS TO ORIGINAL DESCRIPTION: *Male* (n=27): Head with ocelli. Scape without pecten. Forewing length: 4.3–5.5 mm. Without hair pencil from base of hindwing costa. Sternum VIII apically forming pair of broadly rounded lateral projections 1/3 longer than median shortest length of sternum.

Male genitalia (n=3) (Figs 41, 42). Uncus evenly narrowing to roughly pointed apex, slightly downcurved, sparsely setose dorsally, more densely setose and with longer setae at base of branches ventrally. Gnathos almost as long as uncus, median hook free from arms for half of gnathos' length, curved upward at right angle from 3/4. Tegumen rather long and narrow, dorsal connection about half as long as whole tegumen, basal half at right angle from apical half, margins (especially dorsal margin) strongly reinforced especially on basal half, apical half dorsally flat, apical 1/4 appearing to form separate sclerite dorsomedially with rather wide unsclerotized gap connected laterally with narrower incomplete 'sutures' (unsclerotized toward midline) reaching ventral margins of tegumen. Valva reduced to pair of long, narrow projections about 1/3 longer than tegumen, with apical 1/4 curved medially, apically narrowly acute, with short setae mostly along dorsal line from about 1/5 till subapex and at base. Vinculum trough-like, large, down curved, lateral margins narrowing till blunt, flat apex about 1/3 width of base, with short, sparse setation along dorsal margin laterally, slightly denser and longer along apical margin, the latter slightly notched medially. Membrane around phallus spinulose. Phallus broadly down curved, slightly shorter than tegumen, with large and round basal 2/5, narrowing to slightly widened middle, mediodorsally with narrow projection about as long as apical part, projecting anterodextrally and apically rounded, apical 1/3 narrow, slightly narrowing, curving to left, and with lateral slit along left side, with apex pointing to left, rounded; vesica without cornuti.

*Female* (n=35) (Fig. 1): Antenna, colour, and forewing pattern as in male; with pencil of elongate scales at base of forewing Sc ventrally as in male; also with long hair-like scales on Anal vein of hindwing as in male; frenulum with three acanthae; forewing length: 4.3–5.75 mm. Sternum VII with margin broadly concave almost to middle of segment; tergum VII unmodified.

Female genitalia (n=4) (Figs 80–82). Papillae anales slightly elongate, sparsely setose but more densely so along ventral margin and apex, with longer setae dorsally at base. Posterior apophyses reaching middle of antrum when papillae not extended, slightly curved. Anterior apophyses short, about 1/3 length of posterior apophyses and thicker. Segment VIII broadly desclerotized dorsally, leaving only narrow (4/5 length) sclerotized band at base, ventrally with medioapical antrum a large quadrangular sclerotized tongue, curved ventrally and almost as large as rest of tergum VIII. Ductus bursae long and narrow, slightly enlarged and curved on proximal 1/10, before corpus bursae, spiny internally from about 1/5 to 9/10; ductus seminalis from short, narrow subbasal sac. Corpus bursae slightly elongate, scobinated on whole surface; large

signum on short, somewhat circular base protruding from wall of corpus with lateral extensions of short to long, thick spines.

**BIOLOGY:** Moths of *A. navia* have been collected at light in all months of the year, except June and August, and mostly at low elevations, but also at higher localities, up to 700 m on Isabela.

**DISTRIBUTION:** A widespread and frequently observed endemic of the archipelago, *A. navia* has been recorded from 13 of the 19 Galapagos islands of more than 1 km<sup>2</sup> and at all elevations.

**REMARKS:** The forewing pattern of *A. navia* is similar to that of many other species of *Aristotelia* Hübner, but the male genitalia differ wildly from those of most other members of the genus, such as those of the type species, *Tinea decurtella* Hübner, from Europe. However, on the advice of K. Sattler (BMNH), who studied the illustrations of the genitalia that BL sent him, and those of the holotype, *A. navia* should be left in *Aristotelia*. As K. Sattler wrote to BL: "The forewing pattern is typical of that genus and so is the bursa copulatrix with the internally spiny ductus and corpus bursae. The signum is also fairly typical and so is the pattern of the labial palpus."

Meyrick's (1926) description mentions "an expansible grey-whitish hairpencil from base of costa" on the hindwing. A tuft of elongate scales actually occurs ventrally on the forewing at base of Sc, but there is no hairpencil as found in the following species and arising from the base of the hindwing costa.

No significant variation was observed in the seven dissected genitalia examined.

***Aristotelia sarcodes*** Walsingham, 1910

Figs 2, 3, 43, 44, 83

*Aristotelia sarcodes* Walsingham, 1910: 26, pl. 1 fig. 23. – Meyrick, 1925: 47. – Becker, 1984: 45.

**MATERIAL EXAMINED:** 15 ♂, 5 ♀. Male holotype ♂ with the following labels: 'Tabernilla | CanalZone [sic] | Panama', 'Collected by | August Busck', '5842 | WLSM. 1908', 'ARISTOTELIA | SARCODES | Wism. Biol. C-Am. | no. | Pl. | (1909) | TYPE ♂ descr., figd. [undecipherable initial]', 'BL 1658 ♂', Loan from | USNMNH | 2048574': Specimen in poor condition, with most appendages broken except left hindleg and right labial palpus, and with right forewing detached, in a gelatine capsule (USNM). – Panama, CZ, Paraiso (USNM). – Ecuador, Galapagos, Islands: – *Floreana*: Las Cuevas. – *San Cristobal*: near Loberia, GPS: elev. 14 m, S 00° 55.149' W 89° 36.897'; antiguo botadero, ca. 4 km SE Puerto Baquerizo, GPS: elev. 169 m, S 00° 54.800' W 89° 34.574'. – *Santa Cruz*: Estacion Cientifica Charles Darwin. – *Seymour Norte*: No precise locality. Deposited in BMNH, CDRS, MHNG, USNM.

**DIAGNOSIS:** The salmon-pink colour of some of the forewing markings in this species is unique among Galapagos moths (Fig. 2). *Aristotelia roseosuffusella* (Clemens, 1860) and *A. rubidella* (Clemens, 1860) from eastern North America, *A. trossulella* Walsingham, 1897, from the Dominican Republic, as well as other species of *Aristotelia* have pink scales, but often of different hues and differently distributed. The other markings differ, notably the shiny silver bands and spots.

**ADDITIONS TO ORIGINAL DESCRIPTION:** *Male* (n=15) (Figs 2, 3). Head with ocelli. Scape without pecten. Forewing length: 4.0–4.3 mm (Holotype 4.2 mm); ventral surface (Fig. 3) with bunch of elongate, greyish-brown scales at base of Sc, most of surface beige to ochre-orange with large band of black-brown to grey-brown along margins. Hindwing with long, elaborate, ochre hairpencil at base of costa (Fig. 3),

reaching forewing tornus; Anal vein with long hair-like scales. Segment VIII about 1/3 longer than preceding segment, apical margin not modified.

Male genitalia (n=4) (Figs 43, 44). Uncus rather narrow, straight, arms of modest width with 4 setae (one long, three very short) at basoventral corner, more strongly sclerotized along lateral margins, subapically with or without (holotype) tiny, triangular dorsal projection slanted posteriorly, ventrally at 3/4 with low bump with few short setae. Gnathos with short lateral arms hinged to median hook of twice their length, hook narrow, only slightly upcurved, about half as long as uncus or slightly less. Dorsal part of tegumen slightly bulbous, connection about half as long as uncus, arms narrowing to 1/4 maximal dorsal width of tegumen. Membrane conspicuously scobinated laterally, more strongly so near connection of tegumen and valva. Valva somewhat spoon shaped in dorsal view with lateral margin straight and median margin with median concavity, dorsally spinulose at base and with few setae mostly short on apical half, in lateral view showing short, thumb-like, downward projection subapically. Vinculum posterior lobes somewhat laterally compressed, projecting medially and slightly downward, apicoventrally with narrow membranous connection, terminating with dorsal knob covered with short setose projections; saccus somewhat conical, with anterior end rounded and less strongly sclerotized; lateral arms slightly curved; posterior arms pointed and reaching posterior point of connection between posterior lobes of vinculum and valva. Phallus narrow, as long as vinculum + valva, slightly curved to left in dorsoventral view, slightly sinuous in lateral view, with rounded base, apically pointed; vesica spinulose, without cornuti.

*Female* (n=4): Antenna, colour, and forewing pattern as in male; with pencil of elongate scales at base of forewing Sc ventrally as in male; also with long hair-like scales on anal vein of hindwing as in male; without hairpencil at base of hindwing costa. Frenulum with three acanthae. Forewing length: 3.9–4.0 mm. Tergum VII not modified.

Female genitalia (n=3) (Fig. 83). Papillae anales moderately setose, with base more densely setose and basal margin with longest setae. Posterior apophyses narrow, straight except for shallow curve subbasally, rather short, almost reaching ostium when papillae not extended. Anterior apophyses short, about 1/3 length of posterior apophyses and slightly thicker. Segment VIII mostly membranous dorsally, laterally with few setae along apical margin; ventrally with pair of medially connected narrow plates recurved at basal margin to form two medially separate rounded plates projecting apically and laterally closed thus protecting medially located ostium. Ductus bursae long and narrow, with small narrow sclerite in membrane at connecting point of ductus seminalis at 1/5, proximal 2/3 (before corpus bursae) densely spiny internally, but spines blunt. Corpus bursae elongate, about half as long as ductus bursae, lightly scobinated; single signum situated posteriorly to middle of corpus bursae, lozenge shaped in frontal view, with perpendicular slit in middle forming hole in membrane, in lateral view a rounded plate with pair of short projections forming upper and lower lateral walls of slit.

**BIOLOGY:** The moths come to light and in the Galapagos, apart from one specimen collected at 169 m above sea level, all were found close to the sea shore, between February and April.

**DISTRIBUTION:** This beautiful species is known to occur only on four of the Galapagos islands (Floreana, San Cristobal, Santa Cruz, and Seymour Norte) and Panama.

**REMARKS:** *Aristotelia sarcodes* was described from a single male, deposited in the USNM and examined by BL (see label data above). The Galapagos specimens were identified with the help of Dr David Adamski (USNM).

## Gelechiini

### *Chionodes* Hübner, [1825]

A Holarctic and Neotropical genus containing 208 species in the Western Hemisphere (Hodges, 1999) and 20 in Europe (Karsholt & Riedl, 1996). One species has been found in the Galapagos (Schmitz & Landry, 2007). The host plant of this species is unknown but its species group feeds on Malvaceae.

### *Chionodes stefaniae* Schmitz & Landry, 2007

Fig. 4

*Chionodes stefaniae* Schmitz & Landry, 2007: 177–180, figs 1, 3–8.

**MATERIAL EXAMINED:** 20 ♂ (including holotype), 29 ♀ (For details see Schmitz & Landry, 2007).

**DIAGNOSIS:** This species is superficially similar to many other *Chionodes* species and the characters to separate them are mentioned by Schmitz & Landry (2007). With regard to other Galapagos species of Gelechiidae, *C. stefaniae* is unique in its dark brown forewing pattern with a pair of off-white patches on costa and inner margin at 3/4 wing length.

### *Stegasta* Meyrick, 1904

*Stegasta* includes eight species in the Neotropical region and ten in Africa, Asia, and Australia (Becker, 1984; Beccaloni *et al.*, 2003). Robinson *et al.* (2007) record host plants mostly in the Fabaceae, but also in Bromeliaceae, Dipterocarpaceae, Lecythidaceae, and Oleaceae.

### *Stegasta zygotoma* Meyrick, 1917

Figs 5, 45, 46

*Stegasta zygotoma* Meyrick, 1917: 48. – Meyrick, 1925: 87. – Clarke, 1969b: 384, pl. 192 figs 3–3b. – Becker, 1984: 47. – Schmitz & Landry, 2007: 176.

*Gelechia bosquella* [sic] Chambers, 1875. – Schaus, 1923: 31, misidentification.

**MATERIAL EXAMINED:** 5 ♂. Male lectotype: 'Huigra, 4,500 ft., Ecuador, Parish. 6–14' [labels and dissection number not recorded] (BMNH). – *Santa Cruz*: Estacion Cientifica Charles Darwin. Deposited in CDRS and MHNG.

**DIAGNOSIS:** The forewing markings of this species are unlike any others among the gelechiids recorded from the Galapagos, except *Stegasta francisci* sp. n., described below. The dorsally connected subbasal and median ochreous triangular patches and the patches of silver, shining scales at 1/10, 1/4, 1/2, and 2/3 are especially diagnostic of these two species. Within the genus, *S. zygotoma* resembles the new species described below, *S. comissata* Meyrick, 1923, and *S. bosqueella* (Chambers, 1875). It differs from *Stegasta francisci* sp. n. externally by the paler head, presence of dark brown at apex of labial palpus, and presence of three rings of paler, beige scales



towards the apex of the flagellum, i.e. the apical 2 flagellomeres are dark brown, the previous one is beige distally, the previous 3 are dark brown, the previous one beige distally, etc. The differences in genitalia are discussed below in the diagnosis of the new species. *Stegasta comissata* appears to be a smaller species as its lectotype is 8 mm in wingspan (10 mm for a paralectotype female) and that of *zygotoma* is 11 mm. In addition, the head of *S. comissata* is cream coloured, whereas that of *S. zygotoma* is brown with the scales mostly pale brown with their tips dark brown (in Galapagos specimens). The male genitalia of the lectotypes of these two species show some clear differences as illustrated by Clarke (1969b). With regards to *S. bosqueella*, based on specimens in the BMNH and one from Florida, *S. zygotoma* doesn't show obvious forewing differences, but the antennae of the former show 2–3 complete beige rings near the middle of the flagellum, followed by about 9 dark brown flagellomeres, followed by 4 beige rings each separated by 3 completely dark brown rings (or 1.5 dark brown flagellomere given the 2 rings of scales on each flagellomere). Based on Busck (1939) and a Florida specimen, the male of *S. bosqueella* shows obvious differences in, for example, an extra thin and curved projection ventrally on the valva at 1/3 from base and two cornuti in the vesica about half the size of those of *S. zygotoma*.

ADDITIONS TO ORIGINAL DESCRIPTION: *Male* (n=4) (Fig. 5): Head with ocelli. Scape without pecten. Flagellomeres mostly dark brown, first 13–14 with second row of scales beige ventrally, subsequent 4–5 with complete beige ring made of distal set of scales of each flagellomere, subsequent 9–10 entirely dark brown, following one with distal beige ring, followed by 3 dark brown flagellomeres, followed by one with distal beige ring, followed by 3 dark brown flagellomeres, followed by one usually with distal beige ring, followed by distal 2 dark brown flagellomeres. Forewing length: 4.7–5.0 mm. Segment VIII more strongly sclerotized, especially along ventral margins: sternum very large, about 2 X length of segment VII, with thin, reinforced basal margin slightly projecting anteriorly and with slight depression at middle, narrowing laterally and curving upward with denser scaling laterally, with apical margin almost straight, only very slightly depressed medially; tergum small, crescent shaped with broadly rounded ends, about half as narrow and slightly more than half as long as preceding tergum. basal margin broadly convex, strongly reinforced, and apical margin slightly rounded, almost straight.

Male genitalia (n=2) (Figs 45, 46). Uncus short, with pair of separate but close-set, narrow projections curved downward from middle at almost right angle, with apices rounded; also with pair of scoop-like, lateroapically directed, rounded projections at base ventrally, with concave face facing laterally and opposing face adorned with setae of variable sizes, with three longer ones. Gnathos formed by pair of short, thin lateral arms. Tegumen short, about twice as long as uncus; with dorsal connection about 2/5 of whole length, strongly reinforced medially, posteriorly, and at straight anterior margins of wide arms. Valva about 1/4 longer than tegumen + uncus; base wider, forming narrowly rounded lobe in lateral view, reinforced dorsally at base; dorsal margin slightly convex; medial surface apically concave, with thick setae, ventroapically with one shorter and thicker spine directed medially, also with short and thin, sparse setation set mostly along one line along most of medial surface, shorter and denser at base; with short, pointed spine-like projection subapically on ventral margin,

directed downward. Transtilla mostly membranous and narrow, with short, narrow band of sclerotization medially. Vinculum bulky, about 2/5 length of valva and 1/5 wider than long, with anterior margin broadly rounded, with pair of thin bands of reinforcement from middle of posterior margin to sides of anterior margin. Sacculus processes as short, setose knobs joined laterally with medial bases of valvae. Phallus about 1/10 longer than valva, mostly lightly sclerotized, except for slightly enlarged, rounded base slightly projecting left, and narrow rod of reinforcement ventrally on right side; vesica with 2 large, curved, and pointed cornuti; ductus ejaculatorius with short, rounded, elongate area of sclerotization.

*Female*: Unknown to us.

**BIOLOGY**: The host plant is unknown. The moths come to light, and in the Galapagos specimens have been collected near sea level in March.

**DISTRIBUTION**: This species occurs in Colombia, Ecuador, and Peru between sea level and 3200 m according to the original description. In the Galapagos it has been found on the island of Santa Cruz only, at less than 20 m in elevation, on the site of the Charles Darwin Research Station.

**REMARKS**: *Stegasta zygotoma* was described from a series of 44 specimens from Colombia (Cali, 500 ft, and La Cumbre, 6600 ft), Ecuador (Huigra, 4500 ft), and Peru (Lima, [sea level], and Chosica, 2800 ft). Clarke (1969b: 384) designated the lectotype. The rest of the series should be investigated closely to determine if they all belong to *S. zygotoma* given the inconspicuous external differences found between the two Galapagos species.

The record of *Stegasta bosqueella* (Chambers) in the Galapagos (see Introduction and Schaus (1923)) is more probably attributed to this species than to the next because this record is from Santa Cruz Island, as are the available specimens of *S. zygotoma*, while the new species hasn't been found on this island.

***Stegasta francisci* Landry, sp. n.**

Figs 6, 47, 48, 84

**HOLOTYPE**: ♂, 'ECU[ADOR].. GALAPAGOS | Isabela, n[ear] Tagus Cove | 100 m elev[ation].., 21.v.1992 | M[ercury]V[apour]L[amp], leg[it]. B. Landry', 'HOLOTYPE | *Stegasta francisci* | B. Landry'. Specimen in good condition, with some fringe scales of right hindwing missing, undissected. Deposited in MHNG.

**PARATYPES**: 7 ♂, 16 ♀ from Ecuador. – *Galapagos Islands, Fernandina*: 1 ♀ (dissected, slide MHNG ENTO 5954), SW side, G[lobal]P[ositioning]S[ystem]: 352 m elev[ation].., S 00° 20.503' W 091° 36.969', 10.ii.2005, u[ltra]v[iolet][light] (B. Landry, P. Schmitz). – *Galapagos Islands, Floreana*: 1 ♂, 5 ♀ (one dissected, slide MHNG ENTO 6039), close to Las Palmas, GPS: elev. 131 m, S 01° 16.791', W 090° 28.274', 13.iv.2004, uvl (P. Schmitz); 3 ♂ (one dissected, slide MHNG ENTO 5953), 3 ♀ (one dissected, slide MHNG ENTO 5950), close to Las Palmas, GPS: elev. 154 m, S 01° 17.049' W 090° 28.305', 15.iv.2004, uvl (P. Schmitz). – *Galapagos Islands, Isabela*: 3 ♀, 8.5 km N P[uerto] Villamil, 11.iii.1989, M[ercury]V[apour]L[amp] (B. Landry); 1 ♂, 1 ♀ (dissected, slide MHNG ENTO 5952), Alcedo, lado NE [side], 200 m [elev.], camp arida alta, 14.iv.2002, uvl (B. Landry, L. Roque); 1 ♂ (dissected, slide MHNG ENTO 5951), 1 ♀, V[olcan]. Darwin, 300 m elev., 20.v.1992, MVL (B. Landry); 1 ♀ (dissected, slide MHNG ENTO 5948), ± 15 km N Pto Villamil, 25.v.1992, MVL (B. Landry); 1 ♂, V. Alcedo, 1100 m elev., 13.x.1998, uvl (L. Roque). – *Continental Ecuador*: 1 ♂ (dissected, slide MHNG ENTO 6038), Manabi, Puerto Lopez, Hosteria Mandala, S 01° 32.955', W 80° 48.6176', 10 m elev., 24.iv.2006, uvl (P. Schmitz). Deposited in BMNH, CDRS, CNC, and MHNG.

ETYMOLOGY: The species name honours Jean-François Landry, eminent microlepidopterist based in Ottawa, Canada, for his precious collaboration during the process of elucidating the novel status of this taxon and all along the duration of this project, and for his friendship during these last 20 some years.

DIAGNOSIS: In habitus this species is similar to other species of *Stegasta*, notably *S. bosqueella* and *S. zygotoma*, as mentioned above under the diagnosis of *S. zygotoma*. The slight external differences between *S. zygotoma* and *S. francisci* are the darker head of the latter, its labial palpi with white apically, its darker antennae usually with 5 cream rings toward the apex, each separated by 3 dark brown scale rings, and without or almost without a white spot at the forewing apex. In male genitalia this species can be separated from *S. zygotoma* in its narrower and shorter median projections of the uncus, its longer, narrower, and straighter margined valva without an additional short spine at the ventral edge of the median surface apically, its longer phallus with a less bulky base, and by its four differently shaped cornuti on the vesica, as opposed to two large ones in *S. zygotoma*. In forewing pattern and that of the antennae and palpi, *S. francisci* is not distinguishable from *S. bosqueella*. The two can be separated in male genitalia easily, notably by the position of the subapical spine on the ventral edge of the valva, which is near the middle in *S. bosqueella*, the additional recurved projection at the base of the valva ventrally, absent in *S. francisci*, and the presence of two cornuti on the vesica, as opposed to four in *S. francisci*. Female genitalia of *S. zygotoma* were not available for comparison, but those of *S. bosqueella*, based on Busck (1939, fig. 60), do not have the semicircular projections at base of segment VIII ventrally, nor do they show a narrow sclerotized band on the dorsal wall of the ductus bursae, and the posterior part of the corpus bursae is much less strongly sclerotized.

DESCRIPTION: *Male* (n=8). Head dorsally with most scales narrow, greyish brown at their bases, dark brown at their apices; fronto-clypeus with scales dirty white. Haustellum greyish brown and dirty white. Maxillary palpus with dark brown, and white at tip. Labial palpus with basal segment dark brown; second segment mostly dark brown, furrowed ventrally, with white ring before middle, with some white scales dorsally posterior to white ring, and cream at apex dorsally; distal segment dark brown, with white to cream at base, medially as ring, and apex. Antennal scape without pecten, dark brown dorsally, dirty white ventrally, with white to cream (dorsally) apical ring; pedicel and flagellomeres mostly dark brown, first 12–15 flagellomeres with second row of scales partly cream ventrally, subsequent 2–5 with complete cream ring made of distal set of scales of each flagellomere, subsequent 10 entirely dark brown, followed by 5 cream rings each separated by 3 completely dark brown rings (or 1.5 dark brown flagellomere given the 2 rings of scales on each flagellomere) (rings indistinct in some specimens). Thorax mostly deep dark brown with bases of scales paler, sometimes with few narrow scales at base on each side of midline cream or chestnut brown; mesoscutellum cream to ochreous; metathorax pale greyish brown, shining. Foreleg mostly dark brown; tibia with 4 narrow bands of white scales, including one at apex; tarsomere I with white at base and apex; tarsomere II with white at apex only; tarsomeres III and IV entirely dark brown; tarsomere V mostly beige, with dark brown at base. Midleg femur brown, with some dirty white scales randomly

set; tibia dark brown with three small patches of white at base, 1/4, and 1/2, with white band at apex; tarsomere I, II, and V as on foreleg; tarsomeres III and IV with white apex. Hindleg femur with mixture of shining dirty white and pale greyish-brown scales; tibia dark brown, paler than fore- and midleg, with 4 white patches at base, 1/4, and bases of beige spines, also with dorsal crest of thin scales mostly brown; tarsomere I greyish brown with white at base and apices; tarsomeres II–V greyish brown at bases and beige towards apices, the latter colour increasing in importance on each tarsomere. Forewing length: 4.2–4.8 mm (holotype: 4.4 mm). Forewing background colour deep dark brown, with white as small patches on costa at 1/5 and middle, and sometime on midline at apex, and larger patch at 4/5; first costal white patch blending into first sub-basal ochreous triangle opening on dorsum and connecting from dorsum with second, smaller ochreous triangle; with shining silver scaling at 1/10 above and below fold, as band in first ochreous triangle before and along its posterior margin, as large patch in middle around small dark brown discal spot, and at 2/3 below costal white patch until dorsum; fringe with basal set of scales greyish brown with darker brown tip, with second set of scales entirely greyish brown. Hindwing brownish grey with concolorous fringe. Abdomen dorsally greyish brown with paler, dirty white row of scales at apices of segments except for longer, thinner and uniformly greyish-brown scales over genitalia; ventrally grey, with white at base and on penultimate visible sternum; segment VIII more strongly sclerotized than preceding: sternum very large, about 4 X length of segment VII, with anterior margin forming pair of short bumps medially, laterally projecting and curving upward with denser scaling laterally, with apical margin depressed medially and poorly sclerotized; tergum small, shorter (by 1/3) and narrower than preceding tergum, with basal margin convex, more strongly sclerotized, with apical margin slightly rounded.

Male genitalia (n=3) (Figs 47, 48). Uncus short, with pair of separate but close-set, narrow projections curved downward with dorsal margin evenly rounded, with apices rounded; also with pair of scoop-like, lateroapically directed, rounded projections at base ventrally, with concave face facing laterodorsally and opposing face adorned with setae of variable sizes, with 2–3 longer ones, apically almost straight margined. Gnathos formed by pair of short, thin lateral plates. Tegumen short, about 2.5 X as long as uncus; with dorsal connection about 1/2 of whole length, strongly reinforced medially, posteriorly, and at straight anterior margins of wide arms. Valva narrow and about 3/10 longer than tegumen + uncus; base wider, not forming distinct lobe in lateral view, reinforced along base of dorsal margin; dorsal margin mostly straight, curved slightly upward in distal 1/5; medial surface apically concave, with thick setae, without distinct spine ventroapically, with short and thin, sparse setation along two lines on most of medial surface, but denser and shorter at base; with short, pointed spine-like projection subapically on ventral margin, directed downward and medially. Transtilla mostly membranous and narrow, with short, narrow, band of sclerotization medially. Vinculum bulky, almost half as long as valva and 1/2 wider than long, with anterior margin broadly rounded, with pair of thin bands of reinforcement from middle of posterior margin to sides of anterior margin. Sacculus processes forming short, setose knobs joined laterally with medial bases of valvae. Phallus long, about 1/5 longer than valva, mostly lightly sclerotized, except slightly enlarged,

rounded base slightly projecting left, and narrow ventral rod of reinforcement directed from middle at base and gently toward right side apically; vesica with one large, slightly curved and pointed cornuti, 2 smaller straight ones about 1/3 length of larger one, and another plate-like in two parts at right angle from each other and with rounded edges; ductus ejaculatorius with large oval area of sclerotization.

*Female* (n=16) (Fig. 6): Antenna slightly thinner than that of male; colour and forewing pattern as in male; frenulum with 3 acanthae. Forewing length: 3.4–4.6 mm. Segment VII unmodified, slightly longer than segment VI, tapering.

Female genitalia (n=5) (Fig. 84). Papillae anales short, lightly sclerotized, with sparse setation, with longer setae at base dorsomedially. Posterior apophyses thin, straight, long, almost reaching posterior margin of segment VII. Anterior apophyses straight, thin, about 1/5 length of posterior apophyses. Segment VIII at base with pair of flattened, semicircular projections about half as long as whole segment VIII, directed posteromedially, with dense scaling, and with short connections to posterior angles of ductus bursae; posterior parts of segment VIII with smooth, uniformly sclerotized surface, set back dorsad of basal, rounded projections. Ductus bursae strongly sclerotized, short, about 1.5 X as long as wide, with narrow sclerotized band in dorsal wall from almost anterior end of ductus bursae until about middle of segment VIII. Corpus bursae complex, about 3 X length of ductus bursae; enlarged base with strongly sclerotized, waved sheet on right side, with pair of short, lateral chambers dorsally; laterally on right with elongate sac slightly shorter than whole corpus; anteriorly ending in narrower, short circular sac adorned with pair of curved, pointed signa dorsally and ventrally; inception of ductus seminalis at posterior end of lateral membranous sac.

**BIOLOGY:** The host plant is unknown. The moths come to light, and in the Galapagos specimens have been collected between about 100 and 1100 m in elevation, between February and May, and in October. On Continental Ecuador, a specimen was collected near sea level (10 m) in April.

**DISTRIBUTION:** This species was collected on the Galapagos Islands of Fernandina, Floreana, and Isabela as well as in the Province of Manabi, on Continental Ecuador.

## **Gnorimoschemini**

### *Ephysteris* Meyrick, 1908

The Western Hemisphere fauna of *Ephysteris* Meyrick (including synonyms *Microcraspedus* Janse, *Ochrodia* Povolný, *Echinoglossa* Clarke, and *Opacopsis* Povolný) (see Karsholt & Sattler (1998) and Li & Bidzilya (2008) for the generic synonymy, but Lee *et al.* (2009) consider *Microcraspedus* as valid) probably consists of four species. *Ephysteris fontosus* and *E. powelli* (Povolný, 1999) were described from California, and *E. trinota* (Clarke, 1965) from the Juan Fernandez Islands. Beccaloni *et al.* (2003) also record *E. jamaicensis* (Walsingham, 1897), but Becker (1984) mentions this species in *Phthorimaea* Meyrick while Povolný (1966: 145) synonymized the name with *E. subdiminutella* (Stainton, 1867) after a study of the types (see also Povolný, 2002). These four “New World” species, the 30 Palaearctic

species illustrated in Povolný (2002), the additional two Chinese species described by Li & Bidzilya (2008), and *E. longicornis* Clarke (1986), described from the Marquesas Archipelago were checked to make sure that our two Galapagos species were new.

Regarding *E. trinota*, no type designation was made in the original publication (Clarke, 1965). Two female syntypes were found in the USNM and examined by BL. Both were dissected, one by BL (slide N° “BL 1660 §”), bearing a red paratype label with the first three letters (“PAR”) crossed in black ink, and the other by Clarke (No. 10,756), bearing a bluish grey paratype label. The slide of this latter paratype couldn’t be located in the USNM (J. Brown, pers. comm. to BL). The female that BL has dissected is here designated lectotype. It bears the following labels: ‘MASATIERRA | Cerro Alto | 1.II.1952 | 600 m | P. G. Kuschel’ [white card stock, printed in black, with part of date and elevation handwritten in black ink, the elevation written sideways on right side], ‘ATYPE | Echinoglossa | trinota | Clarke’ [red card stock, handwritten in black except for printed ‘ATYPE’ before which ‘PAR’ (presumably) is crossed], ‘67936’ [white lined paper, handwritten in blue ink], ‘BL 1660 ♀’ [green paper, handwritten in black ink], ‘LECTOTYPE | Echinoglossa | trinota Clarke | Des. B. LANDRY’ [red card stock, handwritten in black ink].

Our Galapagos host record in the Poaceae for *E. sporobolella* sp. n. is in accordance with the host plants of two other species of *Ephysteris*, while two more are detritivorous, one feeds on Asteraceae, one on Balanitaceae, and two on Zygo-phyllaceae (Robinson *et al.*, 2007).

*Ephysteris sporobolella* Landry, sp. n.

Figs 7–12, 49, 50, 85

HOLOTYPE ♂, ‘ECU[ADOR].. GALAPAGOS | Santiago, Central, | 700 m elev[ation].. 9.iv.1992 | M[ercury]V[apour]L[amp], leg[it]. B. Landry’, ‘HOLOTYPE | Ephysteris | sporobolella | B. Landry’. Specimen in excellent condition, undissected. Deposited in MHNG.

PARATYPES: 65 ♂, 80 ♀ from the Galapagos Islands, Ecuador. – *Baltra*: 3 ♂, 2 ♀, arid zone, 24.i.1989, M[ercury]V[apour]L[amp] (B. Landry). – *Española*: 1 ♂ (dissected, slide MHNG ENTO 4913), Bahía Manzanillo, 25.iv.1992, MVL (B. Landry); 1 ♂, same data except date, 29.iv.1992; 1 ♀ (dissected, slide MHNG ENTO 4914). Las Tunas Trail, 100 m elev[ation].. 30.iv.1992, MVL (B. Landry); 1 ♂, 1 ♀, Punta Suarez, 2.v.1992, MVL (B. Landry). – *Fernandina*: 1 ♂, 1 ♀. Cabo Douglas, G[lobal]P[ositioning]S[ystem]: S 00° 18.269’. W 091° 39.098’, 9.ii.2005, u[ltra]v[iolet]l[ight] (B. Landry, P. Schmitz); 1 ♂, SW side, GPS: 815 m elev., S 00° 21.270’, W 091° 35.341’, 14.ii.2005, uvl (B. Landry, P. Schmitz); 2 ♀. Punta Espinosa, 12.v.1992, MVL (B. Landry). – *Floreana*: 1 ♀, close to Las Palmas, GPS: elev. 154 m, S 01° 17.049’, W 90° 28.305’, 15.iv.2004, uvl (P. Schmitz); 1 ♀, Punta Cormoran, 21.iv.1992, MVL (B. Landry); 1 ♂, Las Cuevas, 23.iv.1992, MVL (B. Landry). – *Genovesa*: 3 ♀, Bahía Darwin, 10.iii.1992, MVL (B. Landry); 7 ♀ (1 dissected, slide MHNG ENTO 4918), same data except date, 25.iii.1992; 2 ♀. same data except date, 26.iii.1992. – *Isabela*: 1 ♀, Puerto Villamil, 2.iii.1989, MVL (B. Landry); 3 ♂, 4 ♀, 1 km W Puerto Villamil, 3.iii.1989, MVL (B. Landry); 1 ♂, 11 km W Puerto Villamil, 8.iii.1989, MVL (B. Landry); 2 ♂, 8.5 km N Puerto Villamil, 11.iii.1989, MVL (B. Landry); 1 ♀, 11 km N Puerto Villamil, 13.iii.1989, MVL (B. Landry); 1 ♂, NE slope Alcedo, near shore, GPS: 9 m elev., S 00° 23.619’, W 90° 59.715’, 29.iii.2004, uvl (B. Landry, P. Schmitz); 4 ♂, 2 ♀, NE slope Alcedo, near shore, GPS: 292 m elev., S 00° 23.829’, W 91° 01.957’, 30.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♂, NE slope Alcedo, near pega-pega camp, GPS: 483 m elev., S 00° 24.029’, W 91° 02.895’, 31.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♂ (dissected, slide MHNG ENTO 4917), Alcedo, lado NE, playa, night on bushes, 13.iv.2002 (B. Landry); 1 ♂, 1 ♀, Alcedo, lado NE, 400 m [elev.], camp pega-pega, 15.iv.2002, uvl (B. Landry, L. Roque); 1 ♀, Alcedo, lado NE, 700 m [elev.], camp guayabillos, 16.iv.2002, uvl (B. Landry, L. Roque); 2 ♀ (1 dissected, slide MHNG ENTO 4916), Alcedo, lado NE, low

arid zone, bosq[ue]. palo santo, 18.iv.2002, uvl (B. Landry, L. Roque); 3 ♀, Tagus Cove, 13.v.1992, MVL (B. Landry); 1 ♀, V[olcan], Darwin, 630 m elev., 16.v.1992, MVL (B. Landry); 1 ♀, same data except date, 17.v.1992. – *Marchena*: 1 ♀, [no precise locality] 12.iii.1992, MVL (B. Landry); 1 ♂, 1 ♀, [no precise locality] 23.iii.1992, MVL (B. Landry). – *Pinta*: 1 ♂, Playa Ibbeston [sic], 13.iii.1992, MVL (B. Landry); 1 ♂, 1 ♀, arid zone, 15.iii.1992, MVL (B. Landry); 1 ♂, 1 ♀, Cabo Ibbeston, 8 m elev., N 00° 32.819', W 90° 44. 229', 15.iii.2006, uvl (P. Schmitz, L. Roque); 1 ♀, 200 m elev., 16.iii.1992, MVL (B. Landry); 1 ♂ (dissected, slide MHNG ENTO 5325), 18.iii.1992, MVL (B. Landry); 1 ♂, 1 ♀, ±50 m elev., 20.iii.1992, MVL (B. Landry); 1 ♀, ±15 m elev., 21.iii.1992, MVL (B. Landry). – *Pinzon*: 2 ♀, playa Escondida, 20.iv.2002, uvl (B. Landry, L. Roque). – *Plaza Sur*: 1 ♀, [GPS]: 14 m elev., S 00° 34.982', W 90° 09.936', 15.iv.2006, uvl (P. Schmitz). – *San Cristobal*: 1 ♂, 4 km SE P[uer]to Baquarizo [sic], 12.ii.1989, MVL (B. Landry); 2 ♀, 1 km S El Progreso, 14.ii.1989, MVL (B. Landry); 5 ♂, 3 ♀, Pto Baquarizo [sic], 17.ii.1989, MVL (B. Landry); 1 ♂, 1 ♀, pampa zone, 18.ii.1989, MVL (B. Landry); 1 ♂, 4 km SE Pto Baquarizo [sic], 20.ii.1989, MVL (B. Landry); 1 ♀, base of Cerro Pelado, 22.ii.1989, MVL (B. Landry); 1 ♀, antiguo botadero, ca. 4 km SE Pto Baquerizo, GPS: 169 m elev., S 00° 54.800', W 89° 34.574', 25.ii.2005, uvl (B. Landry); 1 ♀, transition zone, SW El Progreso, GPS: 75 m elev., S 00° 56.859', W 89° 32.906', 15.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♂ (dissected, slide MHNG ENTO 4915), near Loberia, GPS: 14 m elev., S 00° 55.149', W 89° 36.897', 16.iii.2004, uvl (B. Landry, P. Schmitz). – *Santa Cruz*: 1 ♀, C[harles]D[arwin]R[esearch]S[tation], arid zone, 17.i.1989, MVL (B. Landry); 2 ♀, same data except date, 19.i.1989; 1 ♂, Barranco, 10 m elev., S 00° 44'34", W 90° 18'21", 26.i.2000, MVL trap (L. Roque, LR # 2000-01); 3 ♂, 6 ♀, littoral zone, Tortuga Bay, 29.i.1989, MVL (B. Landry); 1 ♂, 1 ♀, CDRS, arid zone, 3.ii.1989, MVL (B. Landry); 1 ♂, 1 ♀, Tortuga Res[erve], W S[an]ta Rosa, 6.ii.1989, MVL (B. Landry); 1 ♂, E[stacion].C[ientifica].C[harles].D[arwin]., 7.iii.1992, uvl (B. Landry); 1 ♀, low agriculture zone, GPS: S 00° 42.132', W 90° 19.156', 13.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♂ (dissected, slide MHNG ENTO 5324), Finca Vilema, 2 km W Bella Vista, 1.iv.1992, MVL (B. Landry); 1 ♀, Bahía Conway, 14.iv.1992, MVL (B. Landry); 1 ♂, 1 ♀ (dissected, slide MHNG ENTO 5326), ECCD, El Barranco, 22 m elev., S 00° 44.291', W 90° 18.107', 23.iii.2006, uvl (P. Schmitz); 1 ♂, E.C.C.D., 4.v.1992, yellow light (B. Landry); 1 ♂, Conway Bay, 30.vi.1999, Criada en *Sporobolus virginicus* (L. Roque); 2 ♂, C.D.R.S., Barranco, MVL, 11.xi.1999 (L. Roque). – *Santa Fe*: 2 ♀, Tourist trail, 28.v.1992, MVL (B. Landry). – *Santiago*: 1 ♂, La Bomba, GPS: 6 m elev., S 00° 11.151', W 090° 42.052', 1.iii.2005, uvl (P. Schmitz); 1 ♂, Cerro Inn, 28.iii.1992, MVL (B. Landry); 1 ♂ (dissected, slide MHNG ENTO 5353), 1 ♀, Bahía Espumilla, 4.iv.1992, MVL (B. Landry); 1 ♂, 200 m elev., 5.iv.1992, MVL (B. Landry); 1 ♂, 1 ♀ (dissected, slide MHNG ENTO 4912), Aguacate, 520 m elev., 6.iv.1992, MVL (B. Landry); 1 ♂, same data as holotype. – *Seymour Norte*: 4 ♂, 1 ♀, Arid zone, 23.i.1989, MVL (B. Landry); 1 ♂ (dissected, slide MHNG ENTO 4925), 1 ♀, GPS: 17 m elev., S 00° 23.935', W 90° 17.369', 22.iii.2004, uvl (B. Landry, L. Roque, P. Schmitz); 1 ♀, GPS: 13 m elev., S 00° 24.013', W 90° 17.422', 23.iii.2004, uvl (B. Landry, L. Roque, P. Schmitz); 2 ♂, [no precise locality], 29.iii.1992, MVL (B. Landry). – *Wolf*: 1 ♂ (dissected, slide MHNG ENTO 4919), 2 ♀, N 01° 23.380', W 91° 49.201', 7.ii.2002, uvl (L. Roque, C. Causton). – Deposited in BMNH, CDRS, CNC, MHNG.

ETYMOLOGY: The specific name refers to that of the species' host plant, *Sporobolus virginicus* (L.) Kunth.

DIAGNOSIS: The habitus of this very variable species is best separated from that of *Ephysteris scimitarella* sp. n. by the usually distinctive forewing pattern with the area below the fold paler than the rest of the wing. Otherwise, the black markings are more conspicuous in this species, and it has only the subcostal vein and the cubital stem with an overlay of ochre-orange scales for any length, whereas *E. scimitarella* has most veins covered with similarly coloured scales. *Ephysteris sporobolella* can be separated from *E. scimitarella* in male genitalia more easily by the rounded uncus (vs. apically blunt), the more strongly produced subapical rounded lobes on the tegumen ventrally, the shorter gap between saccular processes (less than half length of valva (up

to 0.46) vs. more than half that length), and especially by the more simple apex of the phallus, without a strong spiniform projection on the right side. In female genitalia this species has a much shorter signum than that of *Ephysteris scimitarella* and its antrum is membranous whereas that of *E. scimitarella* is strongly sclerotized and long. In female genitalia *Ephysteris sporobolella* can be separated from the similar *E. trinota* Clarke by the smaller size (about 3/5 as long from tip of papillae to anterior end of anterior apophyses), the posteriorly converging versus diverging ventrolateral edges of segment VIII, the narrow crescent-shaped ventral edge of the ostium and membranous antrum versus a slightly concave posteroventral edge of the ostium with a long, well-sclerotized antrum (about 2 X as long as wide), the longer sclerites in the ductus bursae posterior to the connection with the ductus seminalis, and the shorter signum (about 1/2 as long). In male genitalia the differences appear subtle, except in the longer parabasal processes reaching 3/4 length of free part of valva, but only Clarke's (1965: 86) drawing of *trinota* is now available for comparison.

DESCRIPTION: *Male* (n=66) (Figs 7, 9, 12). Head with ocelli, mostly pure white with scales tipped brown except on frons and clypeus (holotype) to slightly off-white and/or more conspicuously tipped brown to dark brown, including frons and clypeus. Haustellum and maxillary palpus white, sometimes with brown-tipped scales. Labial palpus with basal segment white and brown: second segment laterally mostly brown with white at base, middle, and tip, sometimes all brown except for white tip of apical scales; terminal segment with white median third and sometimes also on one apical scale, brown to dark brown at base and apex. Antennal scape without pecten, mostly dark brown dorsally, sometimes appearing spotted white from visible white bases of scales, white ventrally; pedicel coloured as scape; flagellum dorsally brown, ventrally brown with white to ochre basal set of scales on each flagellomere. Thorax medially mostly white with some lightly brown-tipped scales, with dark brown basal set of scales and usually with black spot at apex of mesothorax, sometimes ochreous medially, especially on distal half, with or without black apical spot; tegulae mixed dark brown to ochre brown in variable percentages; metathorax pale greyish brown. Foreleg coxa mostly white with some brown-tipped scales or mostly dark brown; femur mostly dark brown with white bases of scales more or less apparent and with some white scales; tibia as femur, with white spots at base of epiphysis and apex; tarsomeres I–IV as femur but with apical white rings, tarsomere V dark brown. Midleg mostly white, with few brown scales on femur; tibia, lateral tibial spine, and bases of distal tarsomeres; sometimes mostly dark brown with white bases of scales more or less apparent and with some white scales, with white spots or rings on tibia at base of epiphysis and apex and on tarsomeres I–IV at apices. Hindleg mostly white with few brown scales on tibia laterally, on lateral spines, and at base of dorsal crest of thinner scales, and dorsally at bases of tarsomeres; sometimes with more dark brown scaling on all parts with, for example, tarsomeres only with apical white rings. Forewing length: 2.8–3.9 mm (holotype: 3.6 mm). Forewing mostly greyish brown on costal half, with paler costa and wider band on distal half of costa, with most scales more or less widely tipped brown, also with chestnut-brown line along Sc at base, along fold, and along midline distally, with black spot in fold at 1/3, and usually also below midline postmedially, and often along midline subapically and at apex, with area below costal



fold paler than above, with few brown-tipped scales; sometimes whole wing darker greyish brown, with black line in fold at base and stronger black spots; darker specimens sometimes with more contrasting chestnut-brown lines as above, with additional lines or spots on dorsum postbasally, at apex of fold, and as scattered scales; fringe mostly greyish brown, with basal scales more or less clearly white based and with brown tip more or less strongly marked. Hindwing greyish brown, with concolorous fringe. Abdomen dorsally greyish brown, with yellowish spine-like scales on tergum II and base of third; ventrally mostly white with some scales brown to greyish brown. Segment VIII with tergum slightly longer than preceding tergum, with basal margin reinforced, thin, straight, with lateral margins parallel sided until middle, then broadly convex; sternum wider than long, about as long as tergum, margins not reinforced, with apical margin medially concave, shallowly rounded, with each side narrowly rounded.

Male genitalia (n=8) (Figs 49, 50). Uncus short, dorsally slightly concave, lateral margins converging, apically rounded, slightly conical, setation short and sparse, along edges; lateral arms terminating in broad, shallow V or U opening posteriorly, with ventral branch often slightly longer. Gnathos arms about half as long as median hook, straight, usually with two, short, triangular dorsal projections postbasally and subapically; gnathos hook with arms separated at base for only 1/4 their length, gently curved at base, then almost straight, apex enlarged dorsally and sometimes also slightly ventrally, dorsoapically with irregular surface, sometimes with 1–2 more or less well-defined hooks, without setae. Tegumen long and narrow, slightly more than 4 X as long as uncus, dorsal connection 2/3 length of tegumen, dorsally flat with median sclerotized bar along middle third and sometimes also toward apex, in dorsal view with lateral margins slightly converging from base to before middle, then margins almost straight to apex, ventrally at apex with short lateral arms projecting underneath lateral arms of uncus; ventrally, before apex, with rounded lobes almost meeting midventrally; pedunculi short, slightly less than 1/3 length of whole tegumen. Valva curving inward and downward, almost reaching apex of tegumen, very slightly enlarged subapically, then tapering to rounded apex, with dense line of short setae along distal 1/2 of dorsolateral edge, except apically, and more sparse longer setae on ventral surface on distal 1/3. Parabasal process slightly curved downward, slightly flattened laterally, with few short setae apicoventrally, almost half as long as free part of valva, with apex rounded. Sacculus processes short, more or less distinctly separated in narrow ventral part and slightly narrower and longer dorsal part (to very distinct parts of equal lengths), with short setae mostly along edges of two parts, separated by U-shaped median gap about 2/5 (0.36–0.46) length of valva. Vinculum narrow; saccus mostly straight, sometimes slightly enlarged subapically, half as long to 3/5 length of phallus, variable in width (0.1–0.2 length of saccus, measured apically). Phallus straight in dorsal view, about as long as saccus + parabasal processes; lateroventrally on right side with more strongly sclerotized bar from base of coecum to apex; distal 1/3–1/4 dorsally open (membranous); apex sometimes slightly more produced on right side and slightly bent, sometimes with tiny pointed or rounded projection on right edge subapically; coecum with lateral margins equally rounded, with ventral margin slightly produced; vesica spiculose, without cornuti.

*Female* (n=80) (Figs 8, 10, 11): Antenna thinner than male's. Frenulum generally with 3 acanthae, sometimes with 2. Forewing length: 2.6–4.6 mm. Segment VII slightly longer than preceding, narrower, not distinctly reinforced at margins, with apical margin of sternum shallowly excavated medially, rounded, with apical margin of tergum straight.

Female genitalia (n=5) (Fig. 85). Papillae anales in lateral view somewhat egg shaped, with setation sparse, mostly short and set along ventral edge and apex, with 3 or 4 longer setae along basal margin and at apex, with microspicules on ventral margin and apex, with poorly sclerotized, often indistinct bar at connection of posterior apophyses. Posterior apophyses straight, long, reaching slightly beyond ostium in extension, with slight swelling at connection with apex of intersegmental membrane VIII–IX. Anterior apophyses straight or slightly curved outward, about half as long as posterior apophyses, connected with moderately sclerotized and narrow, crescent-shaped ventral edge of ostium bursae. Segment VIII narrow, narrowly membranous ventrally and broadly so dorsally, with ventrolateral edges posteriorly diverging, without microsculpture, with ventral membrane spiculate, laterally not tapering towards membranous dorsal gap, with few short setae on apical margin towards dorsal end of sclerotized part. Antrum membranous. Ductus bursae without spicules, posteriorly narrow and membranous for 1/10 of whole length, then sclerotized for about 3/10 of whole length, next 1/10 membranous and narrow, anterior half membranous and twice as wide as posterior one. Inception of ductus seminalis at 4/10. Corpus bursae circular, about as long as ductus bursae, with microspicules at posterior end only; signum trifold, with longitudinal element pointed at both ends, with two antero-lateral points connected to wall of corpus bursae.

**BIOLOGY:** This species was reared in the Galapagos on *Sporobolus virginicus* (L.) Kunth (Poaceae). The moths come to light and were collected mostly at low elevations, in the littoral zone, but also occasionally higher up, such as 700 m on Alcedo, Isabela Island, and 815 m on Fernandina. Based on available specimens adults fly during the first six months of the year, and in November.

**DISTRIBUTION:** Probably endemic, this is the most commonly encountered species of Gelechiidae on the archipelago. It has been found on 15 of the 19 Galapagos islands of more than 1 km<sup>2</sup>, i.e. Baltra, Española, Fernandina, Floreana, Genovesa, Isabela, Marchena, Pinta, Pinzon, San Cristobal, Santa Cruz, Santa Fe, Santiago, Seymour Norte, and Wolf, as well as on the tiny island of Plaza Sur (0.119 km<sup>2</sup>).

**REMARKS:** The variation in the forewing pattern and colour and shape of the saccus in this species is not unique as a similar variation was mentioned also in the description of *Ephysteris powelli* (Povolný, 1999), and *E. subdiminutella* (Stainton) is also very variable (see below). The variation in length of valva and shape of saccus are not correlated in seven specimens compared, i.e. specimens with longer valvae have a longer saccus, but the latter may be narrow or wide, and specimens with short valvae may have a short or long saccus, but the latter is narrower.

*Ephysteris scimitarella* Landry, sp. n.

Figs 13, 51, 52, 86

**HOLOTYPE:** ♂, 'ECU[ADOR]., GALAPAGOS | Santa Cruz, Los | Gemelos, 27.v.1992 | M[ercury]V[apour]L[amp], leg[it]. B. Landry', 'HOLOTYPE | Ephysteris | scimitarella | B.

Landry", 'MHNG | ENTO ♂ | 00005352', 'genitalia slide | BL 1166 ♂' [green, upside down]. Specimen in excellent condition; slide preparation as well, except for sternum VIII, which is detached and folded on itself. Deposited in the MHNG.

PARATYPES: 1 ♂, 4 ♀ from the Galapagos Islands, Ecuador. – *Marchena*: 1 ♀ (dissected, slide MHNG ENTO 4927), [no specific locality], 23.iii.1992, M[ercury]V[apour]L[amp] (B. Landry). – *San Cristobal*: 1 ♀ (dissected, slide BL 1669), pampa zone, 18.ii.1989, MVL (B. Landry). – *Santa Cruz*: 1 ♂ (dissected, slide MHNG ENTO 4907), 2 ♀ (1 dissected, slide MHNG ENTO 4926), same data as holotype. Deposited in CDRS, CNC, MHNG.

ETYMOLOGY: The species name refers to the scimitar-shaped signum in the female corpus bursae.

DIAGNOSIS: This species is characterized in forewing pattern by a uniform background of off-white, brown-tipped scales, with two small black spots and the veins marked with orange-ochre scales. One of the other Galapagos species of *Ephysteris*, *E. sporobolella*, has similar background scaling, but orange ochre only on the cubital stem and the subcostal vein, while the anal sector, below the fold, is clearly paler than the rest of the forewing. In genitalia the two species also differ as mentioned above in the diagnosis of *Ephysteris sporobolella*. *Phthorimaea perfidiosa* Meyrick is also similar in forewing pattern, but this species doesn't have the dark brown spots in the fold and both sexes lack the distinct tuft of scales ventrally on the second segment of the labial palpus.

DESCRIPTION: Male (n=2) (Fig. 13). Head with ocelli, off-white, with most scales tipped brown. Haustellum off-white; maxillary palpus off-white, tipped brown. Labial palpus with basal segment off-white; second segment with tuft of scales projecting ventroapically, dorsally off-white, medially off-white at base and mostly greyish brown on distal 1/3, laterally with most scales off-white tipped dark brown to brown toward apex; third segment mostly dark brown, with off-white at base and middle. Antennal scape without pecten, dark brown with off-white at base of scales and with yellowish-white patch apically; pedicel and flagellum dark brown to brown toward tip, with pedicel and basal ca. 15 flagellomeres with basal set of scales partly forming yellowish-white patch. Thorax at base medially with off-white, brown-tipped scales, including on tegulae on medial edges; tegulae mostly ochre orange (holotype), or as base of thorax medially; metathorax greyish white. Foreleg with off-white, brown-tipped scales; paler on coxa (more off-white than brown); darker on tibia and darkest on tarsomeres, with off-white patches on tibia postmedially and apically and at apex of each tarsomere. Midleg coxa off-white with greyish brown; femur, tibia, and first tarsomere with scales half off-white and half brown; tarsomeres II–V increasingly darker brown; with off-white patches at tips of tibia and tarsomeres. Hindleg as in foreleg although paler, with crest of off-white hair-like scales on dorsal edge of tibia and contrasting dark brown tibial spines; tarsomeres darker brown at their bases. Forewing length: 4.2–4.7 mm (Holotype 4.7 mm). Forewing with off-white, brown-tipped scaling on most of surface, with overlay of orange-ochre scales of variable shades on veins, and along side veins and anal sector on basal half; with beige, narrower scales on distal half of costa; with two black dots in fold at 1/3 and above fold slightly beyond 1/2; fringe's scales off-white and brown tipped, hairs greyish brown. Hindwing greyish brown with concolorous fringe. Abdomen mostly greyish brown

dorsally, terga II and III ochre, with short, pointed scales; ventrally mostly off-white, with few brown specks; sternum VIII narrowing toward apex, with apical margin concave; tergum VIII shorter and narrower than tergum VII, with basal and lateral margins forming narrow, strongly sclerotized bands, median area poorly sclerotized, apical margin rounded.

Male genitalia (n=2) (Figs 51, 52). Uncus short, dorsally slightly concave, lateral margins slightly converging, apically blunt with few short setae; lateral arms terminating in short V opening posteriorly, holotype with ventral branch of V longer, thumb-like. Gnathos arms about half as long as median hook, straight, with two short, triangular dorsal projections postbasally and subapically; gnathos hook with arms only shortly separated at base, gently curved to less than right angle, apex enlarged dorsally with short, rounded projections dorsally, without setae. Tegumen long and narrow, almost 4 X as long as uncus, dorsal connection 2/3 length of tegumen, dorsally flat with median sclerotized bar along median third, in dorsal view with lateral margins slightly converging from base to before middle, then margins slightly diverging to apex, margins ventrally before apex with low, rounded projection, ventrally at apex with short, blunt lateral arms projecting underneath lateral arms of uncus; pedunculi slightly less than 1/3 length of whole tegumen. Valva curving inward and downward, almost reaching apex of tegumen, slightly enlarged subapically, then tapering to narrowly rounded apex, with dense line of short setae along distal 1/2 of dorsolateral edge and more sparse longer setae along midline of lateral surface on distal 1/3. Parabasal process slightly curved downward, with few short setae medially on slightly enlarged distal 2/5, slightly longer than 1/2 valva, with apex rounded. Sacculus processes short, roughly separated in broadly rounded ventral part and slightly narrower and longer dorsal part, with short setae mostly along edges, separated by long, narrow, U-shaped median gap slightly longer than 1/2 length of valva. Vinculum narrow; saccus straight, about 3/5 length of phallus, narrow (0.1 length of saccus, measured apically). Phallus straight in lateral view, about as long as saccus + parabasal processes; ventrally with more strongly sclerotized bar from base of coecum on right side to apex in middle and on left side, on each side of short, ventral, U-shaped gap; distal 1/4 dorsally open (membranous); apex with left lateral wall curved downward and rounded, with right side less strongly sclerotized at base of strongly sclerotized spiniform projection directed apicolaterally at half right angle; coecum with right margin broadly rounded and left margin straight; vesica spiculose, without cornuti.

*Female* (n=4): Antenna slightly thinner than in male; colour as in male. Frenulum with 3 acanthae. Forewing length: 4.9–5.9 mm. Abdomen without modified scales on terga II and III; segment VII about 1/2 longer than preceding segment, apical margin of sternum broadly concave, that of tergum straight.

Female genitalia (n=3) (Fig. 86). Papillae anales in lateral view conical, with apex rounded, setation sparse, mostly along ventral edge and apex, with two longer setae at base toward dorsal margin, with microspicules toward apex, with short sclerotized, perpendicular bar at connection of posterior apophyses. Posterior apophyses straight, long, reaching beyond ostium in extended position, with slight swelling at connection with apex of intersegmental membrane VIII–IX. Anterior apophyses straight, slightly shorter than half as long as posterior apophyses, connected with

strongly sclerotized, narrow ventral edge of ostium bursae. Segment VIII wide, broadly membranous ventrally, without microsculpture, with ventral membrane spiculate, laterally tapering toward membranous dorsal gap, with few short setae on apical margin towards dorsal end of sclerotized part. Antrum strongly sclerotized, narrow, elongate, reaching anterior ends of anterior apophyses, formed by two twisted sclerites, the left one curved ventrally and the right curved dorsally, both forming narrow bump dorsally and ventrally before anterior end. Ductus bursae short and wide, about as long as antrum and as wide as base of antrum, without spicules; ductus seminalis inserted at posterior end, before antrum. Corpus bursae rounded, slightly elongate, slightly longer than antrum + ductus bursae, with spicules on most of inside surface; long, keel-shaped signum with very narrow base, ending in three points, the median one slightly projecting inside bursa.

**BIOLOGY:** Unknown except for the fact that moths come to light and have been found at sea level, at an elevation of 580 m (Los Gemelos), and in the pampa zone (probably above 600 m), in February, March and May.

**DISTRIBUTION:** This species is known only from the Galapagos islands of Marchena, San Cristobal, and Santa Cruz.

**REMARKS:** A long signum in the female corpus bursae was not observed in any of the other verified members of the genus (See Remarks above concerning *Ephysteris sporobolella* sp. n.).

*Ephysteris subdiminutella* (Stainton, 1867)

Figs 14, 53, 54, 87

*Phthorimaea subdiminutella* Stainton, 1867: 145.

*Gelechia jamaicensis* Walsingham, 1897: 76.

*Phthorimaea jamaicensis* (Walsingham). – Becker, 1984: 46.

**MATERIAL EXAMINED:** 2 ♂, 1 ♀ collected on the Galapagos Islands. – *Plaza Sur*: 1 ♀ (dissected, slide MHNG ENTO 5991), S 00° 34.980', W 90° 09.990', 18 m elev[ation].., u[ltra]v[iolet]l[ight]. – *Santiago*: 2 ♂ (one dissected, slide MHNG ENTO 4929), La Bomba, S 00° 11.151', W 090° 42.052', 6 m elev. Deposited in CDRS and MHNG.

**DIAGNOSIS:** This is a highly variable species with several forms of forewing colour and pattern (Povolný, 1966, 2002), but the three Galapagos specimens are all very similar (see Fig. 14). The forewing length varies between 3.6 and 6.3 mm (Povolný, 2002), but the Galapagos specimens have a forewing length between 3.5 and 3.6 mm for the males, and 3.2 mm for the female. The male genitalia are characterized by the parbasal processes being almost as long and as thick as the valvae themselves (Fig. 53). In female genitalia the signum forming a short hook arising from a triangular plate is characteristic (Fig. 87). In the Galapagos this species is most similar to *Agnippe omphalopa* (Meyrick), *Phthorimaea absoluta* Meyrick, and *Scrobipalpula densata* Meyrick. A comparison of genital features is the only way to arrive at an accurate determination.

**BIOLOGY:** Several host plants are known in *Balanites*, *Tribulus*, and *Zygo-phyllum* (Zygophyllaceae) and *Zizyphus* (Rhamnaceae) (Povolný, 2002). The caterpillar first mines a tunnel and then a ramified blotch. Often several leaves are attached. Pupation occurs outside the mines (Povolný, 2002).

**DISTRIBUTION:** Widely distributed in the Palaearctic region, where it possibly originated, this species is believed to have been introduced to the Western Hemisphere

(Povolný, 1966). It is also known from India and Australia (Povolný, 2002). In the Galapagos it has been collected so far only on Plaza Sur and Santiago, near the sea shore.

REMARKS: This species was described at least 15 times and for a complete synonymy one can refer to Povolný (2002). Following the description of synonym *E. jamaicensis* (Walsingham) this species is recorded here for the second time only from the Western Hemisphere.

The Galapagos specimens were identified on the basis of genital illustrations provided by Povolný (2002), i.e. six drawings for males and five for females.

The species is known as the caltrop moth in Australia ([www.ento.csiro.au](http://www.ento.csiro.au)).

### *Phthorimaea* Meyrick, 1902

Povolný (1994: 8) writes that *Phthorimaea* ‘perhaps includes only two distinct species, viz. *P. robusta* [Povolný]..., and *P. operculella*’, and in his checklist of Neotropical species (1994: 10), he lists four species, omitting *P. perfidiosa* Meyrick and the synonyms of *P. operculella*.

*Tuta* Kieffer & Jörgensen, 1910, was recently resynonymized with *Phthorimaea* (Lee *et al.* 2009), following Hodges & Becker (1990) and Karsholt & Sattler (1998). Povolný (1994) disagreed with that synonymy, considering *Tuta* as a valid genus. *Phthorimaea absoluta* was not specifically mentioned by Lee *et al.*, but Lee confirmed that it belongs with *Phthorimaea* (pers. comm. to BL).

In the broad sense, as taken here, *Phthorimaea* is a Neotropical genus that includes 13 species (Povolný, 1994), including two that are now also distributed in the Old World. The host plants of the larvae are mostly Solanaceae, but also Brassicaceae, Myrtaceae, Poaceae, Rubiaceae, and Typhaceae (Robinson *et al.*, 2007).

### *Phthorimaea perfidiosa* Meyrick, 1917

Figs 15, 16, 55, 56, 88

*Phthorimaea perfidiosa* Meyrick, 1917: 41, 42. – Meyrick, 1925: 93. – Povolný, 1989: 93. *Gnorimoschema perfidiosa* (Meyrick). – Clarke, 1969b: 160, figs 3–3b. – Becker, 1984: 46.

MATERIAL EXAMINED: 13 ♂, 7 ♀. Male lectotype (dissected, slide 5828, Clarke), “La Crumbre [sic], Colombia P. 6,600 ft. 5–14.” (BMNH). – *Fernandina*: Cabo Douglas, S 00° 18.269' W 091° 39.098'. – *Genovesa*: Bahía Darwin. – *Isabela, Darwin*: Tagus Cove. – *Isabela, Sierra Negra*: 1 km W Puerto Villamil. – *Pinta*: arid zone; ±15 m elev. – *Santa Cruz*: Estacion Cientifica Charles Darwin. – *Santiago*: Cerro Inn. Deposited in BMNH, CDRS, CNC, and MHNG.

DIAGNOSIS: Among Galapagos Gelechiidae this species can be separated by its greyish-brown forewing with a poorly contrasted pattern of chestnut brown along the veins, sometimes with a small dark brown spot in the fold submedially, and rarely with another smaller dark brown spot above it in the cell. *Ephysteris scimitarella* sp. n. has a similar wing pattern although its forewing has a dark brown spot in the fold at 1/3 and another above the fold slightly beyond middle, and both sexes have the second segment of the labial palpus adorned with a distinct tuft of scales ventrally. *Phthorimaea absoluta* Meyrick has a similar pattern but the forewing is darker brown and the chestnut markings of the forewing are not restricted to fine longitudinal lines; there are often spots instead of lines, especially in the middle of the wing. The males of *P. perfidiosa* are easier to separate because of their elongate tergum VIII covered with

narrow, whitish beige, partly erect scales and flanked by a pair of concolorous coremata barely reaching the apex of the tergum (Fig. 16). *Phthorimaea perfidiosa* is similar to *P. operculella* (Zeller, 1873) a widespread pest of potato, including in the shape of the male's tergum VIII. The former can be separated from the latter by its smaller size (forewing length of *P. operculella* ca. 7 mm). The male genitalia of *P. perfidiosa* differ mainly in the less strongly developed sacculus processes, only slightly produced ventroapically and slightly shorter than the parbasal processes, the latter forming a short, strongly sclerotized hook. In *P. operculella* the sacculus processes form distinct projections with a short, curved tip (see Zimmerman, 1978: 77, fig. 30), and the parbasal processes are shorter rounded projections. Also, the fold between the sacculus processes is long and narrow with parallel margins whereas that of *P. operculella* is broader anteriorly, narrower subapically, and broadly opening posteriorly. The gnathos of *P. perfidiosa* is circular whereas that of *P. operculella* is slightly elongate, tongue shaped. In female genitalia the anterior apophyses extend anteriorly beyond the sclerotized section of the ductus bursae in *P. operculella* whereas they barely reach it in *P. perfidiosa*. The posterior apophyses also are longer in *P. operculella*, reaching the anterior end of the sclerotized section of the ductus bursae, whereas in *P. perfidiosa* they reach the middle of the sclerotized section of the ductus bursae.

ADDITIONS TO ORIGINAL DESCRIPTION: *Male* (n=12) (Figs 15, 16): Head with ocelli. Scape without pecten. Forewing length: 3.5–4.5 mm. Sternum VIII elongate, as long as two preceding abdominal segments, all equally sclerotized, with straight base, narrowly rounded apically; tergum VIII as long as sternum, tongue shaped, with membranous basal 1/3, with strongly concave base.

Male genitalia (n=5) (Figs 55, 56). Uncus with apical margin straight or slightly depressed medially, with 3 microsetae widely spaced on each side; apical angles rounded; lateral margins very slightly projecting laterally and downward, rounded; with pair of patches of about 9 microtrichiae dorsally on each side toward apex. Gnathos circular, covered with small spines, with lateral margins strongly reinforced on basal half; apex broadly rounded, not upturned. Tegumen long and narrow, dorsal connection about 3/5 length of whole tegumen, dorsally slightly depressed before middle, with base dorsally and dorsal part of basal arms covered with spinules. Valva long and narrow, apical 1/10 reaching beyond uncus, enlarged, and bent medially and downward at about half right angle; with apex more strongly sclerotized, devoid of setae, and pointed. Sacculus processes only slightly produced ventroapically and shorter than parbasal processes. Latter forming short, strongly sclerotized hook. Vinculum slightly concave, rectangular, about 2/5 length of tegumen + uncus, with lateral margins reinforced, parallel sided, with apical margin slightly convex, rounded. Phallus narrow, about 1/10 shorter than length of whole genital capsule, upcurved, subbasally expanded laterally and dorsally, with narrower, rounded base; ventrally reinforced by pair of rods, the left one ending subapically, the right one apically ending in right, spoon-shaped wall; apex with two short, narrow, curved 'cornuti.'

*Female* (n=7): Antenna thinner than male's; colour and forewing pattern as in male; hindwing without hair pencil on costa; frenulum with 3 acanthae; forewing length: 4.2–4.7 mm. Segment VII unmodified, longer and narrower than segment VI.

Female genitalia (n=3) (Fig. 88). Papillae anales elongate, lightly sclerotized, setation sparse with few longer setae mediodorsally at base. Posterior apophyses thin, straight, and long, reaching about 1/3 length of anterior apophyses. Anterior apophyses about half as long as posterior apophyses and slightly thicker, mostly straight, slightly curved upward and bent inward at their apices. Segment VIII ventrad of ostium forming short plate with straight apical margin, with short, posteriorly directed spine-like projection on each side laterally; inner wall anteromedially with microsculpture of pentagons changing into spinules toward posterior margin. Segment VIII dorsad of ostium medially unsclerotized and spiculate, forming dorsal wall of funnel, laterally with two wide, apically narrowing, strongly sclerotized plates with rich microsculpture of pentagons except on narrower lateroapical apices. Ductus bursae strongly sclerotized, long, reaching slightly beyond anterior apophyses, anteriorly with membranous gap followed by short, subquadrate ventral plate laterally more strongly sclerotized. Inception of ductus seminalis at posterior end of corpus bursae, behind connection with ductus bursae. Corpus bursae elongate, about 1/3 longer than ductus bursae, slightly wider at anterior end; signum curved, narrow, spine-like, situated ventrally and at 1/3 from posterior end.

**BIOLOGY:** Unknown except that the species was found in the Colombian Andes at about 2200 m and in the Galapagos mostly at sea level. The moths are attracted to light and in the Galapagos specimens were collected in February, March, and May.

**DISTRIBUTION:** Colombia and Ecuador; Galapagos islands of Fernandina, Genovesa, Isabela, Pinta, Santiago, and Santa Cruz.

**REMARKS:** The widespread *Phthorimaea operculella* Meyrick, a notorious pest of potato and other Solanaceae, has not yet been reported in the Galapagos, but its eventual presence is likely.

***Phthorimaea absoluta* Meyrick, 1917**

Figs 17, 57, 89

*Phthorimaea absoluta* Meyrick, 1917: 44.

*Gnorimoschema absoluta* (Meyrick). – Meyrick, 1925: 91. – Clarke, 1965: 80, fig. 80. – Clarke, 1969b: 143, figs 1–1b.

*Scrobipalpula absoluta* (Meyrick). – Povolný, 1967: 125. – Becker, 1984: 47.

*Scrobipalpuloides absoluta* (Meyrick). – Povolný, 1987: 69.

*Tuta absoluta* (Meyrick). – Povolný, 1994: 9, 10. – Causton *et al.*, 2006: 140. – en.wikipedia.org (checked October 5, 2009). – www.tutaabsoluta.com.

**MATERIAL EXAMINED:** ♂, ♀. Male holotype, described from Huancayo, Peru [labels and dissection number not recorded] (BMNH). – *Fernandina*: Cabo Douglas, S 00° 18.269' W 091° 39.098'; SW side, 815 m elev., 00° 21.270' W 091° 35.341'. – *Isabela, Sierra Negra*: ±15 km N Puerto Villamil. – *San Cristobal*: Puerto Baquerizo, larva minador hojas *Solanum tuberosum*. Deposited in CDRS and MHNG.

**DIAGNOSIS:** This species is similar to its congener, *P. perfidiosa* and to *Scrobipalpula densata* (see Diagnosis of these species, above and below). The male is especially easy to separate as it doesn't show the specialized features of tergum VIII found in the two above-mentioned species.

**ADDITIONS TO ORIGINAL DESCRIPTION:** *Male* (n=3) (Fig. 17): Head with ocelli. Scape without pecten. Forewing length: 4.1 mm. Abdomen without terminal hair



pencils. Tergum VIII slightly longer and narrower than sternum VII, with narrow, strongly sclerotized, evenly concave basal margin, with lateral margins parallel and apical angles rounded, with apex straight. Sternum VIII wider and slightly longer than sternum VII, with basal margin slightly concave in middle, not reinforced, lateral margins rounded, and apex straight.

Male genitalia (n=2) (Fig. 57). Uncus quadrangular, with apical margin straight, with lateral angles slightly produced as short triangles; dorsum slightly depressed in middle, with about 12 microsetae apicolaterally; lateral margins slightly converging and rounded. Gnathos with lateral margins strongly sclerotized, parallel, with dorsal, triangular projection near middle, joining in pointed, upturned apex; dorsal membrane poorly spiculose. Tegumen long, dorsal connection  $3/5$  length of whole tegumen, with slight lateral constriction at about  $2/3$  length of dorsal connection; dorsally flat; without spinules. Valva long and narrow, basal  $2/5$  strongly sclerotized, apical  $3/5$  slightly directed ventrally, apically enlarged, rounded, and directed medially. Saccular processes strongly sclerotized, widely separated in broad V, laterally compressed with ventral hump in ventral view, square in lateral view, with short setation laterally on hump and apicodorsal angle, latter with short spine at apicodorsal angle. Parabasal processes as small digit-like knobs with 2–4 apical setae slightly longer than processes. Vinculum slightly concave, elongate and narrow, about  $2/3$  length of tegumen + uncus, with lateral margins reinforced, parallel sided, with apical margin slightly rounded. Phallus narrow and straight, about as long as whole genital capsule; base slightly enlarged, rounded, with slight downward angle from shaft; shaft with short spine-like projection ventrally on right side at  $4/5$ ; ventrally reinforced by pair of rods; apically with left wall spoon shaped, right wall narrower; apex with one narrow, curved 'cornutus' about  $1/10$  length of whole phallus.

*Female* (n=2): Antenna thinner than male's; colour, and forewing pattern as in male; frenulum with 3 acanthae; forewing length: 4.3–4.5 mm. Segment VII unmodified, longer than segment VI and gently tapering to about  $2/3$  basal width; apical margin straight.

Female genitalia (n=2) (Fig. 89). Papillae anales short, lightly sclerotized, setation sparse with few longer setae mediodorsally at base. Posterior apophyses thin, straight, and long, about 5 X length of papillae anales and reaching slightly beyond ostium bursae. Anterior apophyses about  $1/3$  length of posterior apophyses, slightly thicker, straight or slightly curved inward, directed slightly upward, apically not bent. Segment VIII ventrad of ostium undifferentiated, ventral lip of ostium situated in inter-segmental membrane VII–VIII; dorsad of ostium medially with pair of spinulose, separate troughs converging at mid-length, lateral plates with thick sclerotization only along rounded medial-apical margins, without special microsculpture, with 5–6 setae at apicolateral angles; dorsally membranous. Ductus bursae strongly sclerotized, long, slightly tapering anteriorly, reaching slightly beyond anterior apophyses, anteriorly with short membranous section. Inception of ductus seminalis at posterior end of corpus bursae, behind connection with ductus bursae. Corpus bursae elongate, about  $1/2$  longer than ductus bursae and  $1/4$  as wide, forming elongate oval; straight, narrow spine-like signum situated ventrally and at  $1/3$  from posterior end.

**BIOLOGY:** The tomato leaf miner is a pest of tomato (*Solanum lycopersicum* L.) and other Solanaceae, such as potato (*Solanum tuberosum* L.). The moths come to light and hide during the day. The female lays about 250 eggs on the underside of leaves or stems. The larva mines the leaf, flower, stem, or fruit of its host and goes through four instars before pupation. The whole life cycle takes 30–40 days depending on temperature conditions. There may be up to 12 generations per year ([www.tutaabsoluta.com](http://www.tutaabsoluta.com)). In the Galapagos, the few specimens available were collected at light or reared as a leaf miner on potato in February, May, and November, from the arid zone to 815 m elevation on Fernandina.

**DISTRIBUTION:** This species is widely distributed in the Neotropical region, where it originated (Povolný, 1994). Clarke (1965) reports it from Chile, Peru, and Venezuela. It has also spread to Europe and North Africa ([www.tutaabsoluta.com](http://www.tutaabsoluta.com)). In the Galapagos it is known to us from the islands of Fernandina, Isabela, and San Cristobal.

**REMARKS:** On Fernandina, where tomato and potato are not known to occur, this species could feed on several other Solanaceae known to occur on that island, such as members of *Acnistus*, *Exodeonus*, *Jaltomata*, *Physalis*, and *Solanum* (Lawesson *et al.*, 1987). The status of the endemic species of Solanaceae may be at risk from damages caused by *P. absoluta*.

### *Scrobipalpula* Povolný, 1964

This genus, including *Scrobipalpulopsis* Povolný, synonymized by Hodges in Lee *et al.* (2009), is mostly found in the Western Hemisphere, with one super species or species complex (*S. psilella* (Herrich-Schäffer)) in the Palaearctic region. It includes about 48 described species in the Nearctic and Neotropical regions combined (Povolný, 1994; Powell & Povolný, 2001; Lee *et al.*, 2009). The new species described below are part of the group with three paired (or simple) processes of the sacculus and valva. Nevertheless, all Neotropical species of *Scrobipalpula* *sensu lato* were checked to make sure that our Galapagos species was new. These include the 33 species listed by Povolný (1994) as well as 8 more described by Povolný (1987) in either *Scrobipalpula* or *Scrobipalpulopsis*, but later moved to other genera. Species of *Scrobipalpula* mostly feed as larvae on Asteraceae, but also on Chenopodiaceae, Polemoniaceae, Rosaceae, Scrophulariaceae, and Solanaceae (Powell & Povolný, 2001; Robinson *et al.*, 2007).

### *Scrobipalpula densata* (Meyrick, 1917)

Figs 18, 58, 59

*Phthorimaea densata* Meyrick, 1917: 42.

? *Scrobipalpula densata* (Meyrick). – Povolný, 1967: 94, 95, fig. 84.

*Gnorimoschema densata* (Meyrick). – Meyrick, 1925: 91. – Povolný, 1989: 66, 67. – Clarke, 1969b: 148, pl. 74 figs 4–4b.

*Scrobipalpula densata* (Meyrick). – Becker, 1984: 47. – Povolný, 1990: 195, fig. 57.

**MATERIAL EXAMINED:** 1 ♂, 'ECU. GALAPAGOS | Sombrero Chino Ex larva | en frutos de *Cacabus* | *miercii* [sic] 6 VII 1998 | C. Causton No. 99.31', 'slide | BL 1668 \$'. Deposited in CDRS.

**DIAGNOSIS:** A brown moth (Fig. 18) with dark brown at base, as a patch at about 1/4 from costa to middle of wing, and as a spot just before apex; also with chestnut-

brown scales; forewing length: 5.13 mm in Galapagos specimen. The wing pattern doesn't allow a determination among species of *Scrobipalpula*. The male genitalia (Fig. 58) are similar to those of a group of species including *S. ilyella* (Zeller, 1877), *S. ephoria* (Meyrick, 1917), and *S. caustonae* sp. n., but on the phallus, the long coecum penis, reaching about 44% of the whole phallus length, the curved apical point, and the short subapical point, both directed to the right, are diagnostic. Among other Galapagos gelechiids this species is most similar to *Phthorimaea absoluta* Meyrick, but it is larger by 1 mm in forewing length, and it has distinct dark brown markings.

REMARKS: This species had not been recorded previously in the Galapagos. It was known only from Peru. The single known Galapagos locality, Sombrero Chino, is a small islet north of the island of Santa Cruz.

The illustration of a female *S. densata* by Povolný (1967: 92) was actually that of a *Symmetrischema laciniosa* (Meyrick, 1931) as explained by Povolný (1989: 66, 67), and the female of *S. densata* hasn't been described.

A second, smaller specimen of Gelechiidae (forewing length: 4.56 mm) was reared from fruits of *Cacabus miersii* (Hook. f.) Wettst. (Solanaceae) by C. Causton (No. 99.32) collected on Fernandina island, two km west of Punta Espinoza (specimen in CDRS). The female genitalia (slide BL 1178) (Fig. 90) are very similar to those of *Scrobipalpula fjeldsai* Povolný (1990: 190), also illustrated more fully by Povolný (1967: 96), except for the asymmetric anterior apophyses. This, however, may be the result of a malformation although such asymmetry sometimes occurs in *Gnorimoschema* and *Euscrobipalpa* (see Povolný, 2002). The two Galapagos moths appear similar externally, although the male is larger and darker, but both are damaged and have the fringes stuck together as if the specimens have been wetted. For the time being, until more specimens become available, the female is identified as *Scrobipalpula ?densata* (Meyrick).

The host plant, also known as the Galapagos shore petunia, is endemic and distributed on most of the Galapagos islands (McMullen, 1999).

### *Scrobipalpula inornata* Landry, sp. n.

Figs 19, 60, 61, 91

HOLOTYPE: ♂, 'ECU[ADOR]., GALAPAGOS | Española, Bahía | Manzanillo, 25.iv.1992 | M[ercury]V[apour]L[amp], leg[it]. B. Landry', 'HOLOTYPE | Scrobipalpula | inornata | B. Landry'. Specimen in excellent condition, not dissected. Deposited in the MHNG.

PARATYPES: 25 ♂, 25 ♀ from the Galapagos Islands, Ecuador. – *Baltra*: 1 ♂, 1 ♀ (dissected, slide MHNG ENTO 4923), arid zone, 24.i.1989, M[ercury]V[apour]L[amp] (B. Landry). – *Española*: 4 ♂ (1 dissected, slide MHNG ENTO 5359), 1 ♀ (dissected, slide MHNG ENTO 5955), same data as holotype; 2 ♂, same data except 29.iv.1992; 1 ♂, Las Tunas Trail, 100 m elev[ation]., 30.iv.1992, MVL (B. Landry). – *Pinzon*: 1 ♂ (dissected, slide MHNG ENTO 5958), 1 ♀, playa Escondida, 14 m elev., S 00° 35.928', W 90° 39.291', 27.iii.2006, u[ltra]v[iolet] [ight] (P. Schmitz); 2 ♂, 5 ♀, playa [sic] Escondida, 20.iv.2002, uvl (B. Landry, L. Roque). – *Plaza Sur*: 1 ♀, 14 m elev., S 00° 34.982', W 90° 09.936', 15.iv.2006, uvl (P. Schmitz). – *Rabida*: 3 ♂, 1 ♀, Tourist Trail, 3.iv.1992, MVL (B. Landry). – *Santa Cruz*: 1 ♂, C[harles]D[arwin]R[esearch]S[tation], Arid zone, 17.i.1989, MVL (B. Landry); 1 ♀, casa L. Roque-Albelo & V. Cruz, G[lobal]P[ositioning]S[ystem]: 13 m elev., S 00° 42.595', W 90° 19.196', 27.ii.2005, uvl (B. Landry); 1 ♀, E[stacion]C[ientifica].C[harles].D[arwin]., 4.iii.1992, MVL (B. Landry); 2 ♀, same data except 6.iii.1992, UVL; 1 ♀, same data except 7.iii.1992; 4 \$ (one dissected, slide MHNG ENTO 5956), 4 ♀ (one dissected, slide MHNG ENTO 5957), low agriculture zone,

GPS: S 00° 42.132', W 90° 19.156', 13.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♂, CDRS base of El Barranco, GPS: S 00° 44.305', W 90° 18.105', 18.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♀, CDRS, wall of Invert[ebate]s Lab[oratory]., GPS: elev. 11 m, S 00° 44.478', W 90° 18.132', 19.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♀, Finca Vilema, 2 km W Bella Vista, 1.iv.1992, MVL (B. Landry); 1 ♂, agriculture zone, finca C. Troya, N Bella Vista, GPS: 294 m elev., S 00° 40.756', W 90° 18.671', 9.iv.2004, uvl (B. Landry); 1 ♀, CDRS, Barranco, 20 m elev., 30.iv.2002, uvl (B. Landry); 1 ♀, Barranco, E.C.C.D., 13.ix.1999, MVL (L. Roque); 1 ♀, (Indefatigable), xii.1968, B[ritish].M[useum]. 1969–17, Ref. No. L (R. Perry & Tj. De Vries). – *Santa Fé*: 2 ♂. Tourist trail, 28.v.1992, MVL (B. Landry). – *Seymour Norte*: 1 ♂, 1 ♀, Arid zone, 23.i.1989, MVL (B. Landry); 1 ♂, GPS: 17 m elev., S 00° 23.935', W 90° 17.369', 22.iii.2004, uvl (B. Landry, L. Roque, P. Schmitz). Deposited in BMNH, CDRS, CNC, and MHNG.

OTHER MATERIAL EXAMINED: 28 unspread, pinned or glued specimens of both sexes collected at light at the Darwin Station, Santa Cruz Island, by J. & N. Leleup in October and November 1964 (MHNG); 2 unspread, pinned specimens from the same locality, collected on 22 and 25 February 1964 by D. Q. Cavagnaro & R. O. Schuster (CAS).

ETYMOLOGY: The species name refers to the absence of markings on the forewing of the moth.

DIAGNOSIS: Among Galapagos Gelechiidae this species is remarkable in its unmarked, uniformly coloured light beige forewings, thorax, and head. *Scrobipalpus flava* Povolný, from Argentina, has no markings on the forewing, but its colour is straw yellow, the hindwing is pure white, and the length of the forewing is two to three times that of *S. inornata*. *Scrobipalpus pallens* Povolný, from Argentina and Chile, may have individuals that are 'almost clear whitish cinereous' (Povolný, 1987: 20), but most individuals are darker grey to blackish, and the forewing length is between 4 and 6 mm. The two species also have obvious genital differences with regard to *S. inornata*.

DESCRIPTION: *Male* (n=26) (Fig. 19). Head with very small ocelli, scale cover appressed, with scales of posterior part of head converging medially, and scales of anterior part converging medioanteriorly; colour whitish beige with scales of posterior part slightly darker, subapically tinged with light greyish brown (SLGB). Haustellum white. Labial palpus whitish beige, laterally with some scales subapically tinged with light greyish brown at bases of palpomeres 2 and 3; palpomere 3 slightly shorter than second; palpomere 2 with furrow ventrally. Antennal scape without pecten, whitish beige, sometimes with scales SLGB; flagellomeres ringed with light beige and light greyish brown. Thorax with scales coloured as posterior part of head; postscutum with white scales laterally; postscutellum scaled light greyish brown. Foreleg coxa whitish beige, with few scales SLGB; femur mostly greyish brown, with scales subapically tinged greyish brown; tibia brown, with scales white at base and apex, subapically brown, with beige spots at base, 1/3, 2/3, and apex; tarsomeres I–IV concolorous with tibia, apically ringed whitish beige; tarsomere V brown. Midleg patterned as foreleg, but lighter, beige with fewer scales subapically tinged brown. Hindleg whitish beige, with few subapically tinged brown scales on tibia laterally, lateral tibial spines, and bases of tarsomeres. Forewing length: 3.1–3.7 mm (Holotype: 3.4 mm). Forewing beige, with scales SLGB, darker tinged toward apical 1/3 of wing and base of costa; fringe concolorous. Hindwing greyish brown with greyish beige fringe. Abdomen dark greyish brown dorsally on first two segments, paler toward apex, each segment apically with row of greyish white scales; ventrally whitish beige; sternum VIII about 2 X length of VIIth, narrower, with basal margin broadly concave, reinforced with

narrow, strongly sclerotized band; tergum VIII slightly shorter than sternum, about  $1/3$  broader, apically broadly rounded, without basal reinforcement.

Male genitalia ( $n=3$ ) (Figs 60, 61). Uncus mediodorsally with erect, rounded mouse ear-like projections with serrated margins and separated by space shaped like normal distribution curve; in ventral aspect rounded with lateral margins slightly tapering to pair of short, rounded projections between rounded median notch. Gnathos a circular shallow bowl with strongly sclerotized margins and short, narrow arms, spinulose on circular section with spinules longer marginally. Tegumen long and narrow, 3 X longer than uncus, dorsal connection  $2/3$  length of tegumen, dorsally with postmedian, shallow depression; in dorsal view with lateral margins converging until  $2/3$ , then parallel sided; pedunculi moderately wide. Valva narrow, slightly curving outward before middle, curved inward and downward subapically; slightly longer than tegumen and reaching slightly beyond uncus; apex with margin slightly concave, with short setae ventrally and dorsally; distal half with sparse setation of moderate length laterally. Median sacculus processes about half as long as valva, connected on basal half, with free distal parts slightly tapering and converging, with short, sparse setation ventrally on distal  $2/3$  and dorsally at apex. Lateral sacculus processes laterally compressed to thin sheets with wide base and narrow distal half, slightly shorter than median parbasal processes, apically with short apical tooth projecting dorsally and few short setae. Parbasal processes digit-like, short, about  $1/3$  length of median sacculus processes, directed slightly outward, with short setae dorsally. Vinculum and saccus equal in length; saccus tapering, with rounded apex. Phallus thin and long, slightly longer than whole genital capsule, upcurved gently, base only slightly enlarged, with short, narrower coecum, apically with two narrow 'cornuti' connected at base, more apical one hook-like, other boomerang-like.

*Female* ( $n=25$ ): Antenna and colour as in male. Frenulum with 3 acanthae. Forewing length: 3.1–3.9 mm. Abdominal segment VII about 2 X length of preceding segment, slightly more strongly sclerotized, with apical margin straight.

Female genitalia ( $n=3$ ) (Fig. 91). Papillae anales lightly sclerotized, slightly elongate, setose. Posterior apophyses thin, straight and long, reaching ostium in extended position. Anterior apophyses straight, slightly directed outward, short, about  $1/5$  length of posterior apophyses. Segment VIII ventrally well sclerotized except along straight apical margin, without microsculpture, with spiculose, triangular sections laterally from bases of anterior apophyses to apical margin, along apical margin, and ventrally toward antrum, with narrow, shallow longitudinal furrow ventrally; segment VIII dorsally with membranous, spiculose median band longitudinally flanked by narrow, sclerotized bands curving laterally with narrow laterodorsal ends set with short setae, not connected dorsally. Ductus bursae long, with slightly enlarging posterior half well sclerotized and spiculose, median  $1/4$  membranous, and anterior third well sclerotized; ductus seminalis inserted next to connection between ductus and corpus bursae. Corpus bursae pear shaped, slightly longer than ductus bursae; signum a pointed hook on left side at posterior  $1/4$ .

**BIOLOGY:** The host plant is unknown. The moths are attracted to light and have been collected from January until May, and from September until December, at low elevations, from sea level to 294 m above sea level.

DISTRIBUTION: Galapagos islands of Baltra, Española, Pinzon, Plaza Sur, Rabida, Santa Cruz, Santa Fe, and Seymour Norte.

REMARKS: The distribution of this presumably endemic species is curious. Based on available material it is absent from the oldest island, San Cristobal, and from the youngest islands, Isabela and Fernandina.

*Scrobipalpula equatoriella* Landry, sp. n.

Figs 20, 21, 62, 63, 92

HOLOTYPE: ♂, 'ECU[ADOR].. GALAPAGOS | Santa Cruz, E[stacion].C[ientifica]. C[harles].D[arwin]. | 7.iii.1992. U[ltra]V[iolet]L[ight] | leg[it]. B. Landry'. 'HOLOTYPE | Scrobipalpula | equatoriella | B. Landry'. Specimen in excellent condition, not dissected. Deposited in the MHNG.

PARATYPES: 4 ♂, 15 ♀ from the Galapagos Islands, Ecuador. – *Baltra*: 2 ♀ (one without abdomen), arid zone, 24.i.1989, M[ercury]V[apour]L[amp] (B. Landry). – *Santa Cruz*: 1 ♂, casa L. Roque-Albelo & V. Cruz, G[lobal]P[ositioning]S[ystem]: 137 m elev[ation].. S 00° 42.595', W 90° 19.196', 20.ii.2005. u[ltra]v[iolet]l[ight] (B. Landry); 1 ♂ (dissected, slide MHNG ENTO 5960), 4 ♀ (one dissected, slide MHNG ENTO 5959), same data as holotype; 5 ♀ (one dissected, slide MHNG ENTO 5961), wall of Invert[ebate]s. Lab[oratory].. GPS: elev. 11 m, S 00° 44.478', W 90° 18.132', 19.iii.2004, uvl (B. Landry, P. Schmitz); 4 ♀, same data except 6.iv.2004; 2 ♂ (one dissected, slide B.M. No. 29741), xii.1968, B[ritish].M[useum]. 1969–17, Ref. No. L. 52 (R. Perry & Tj. De Vries).

Deposited in the BMNH, CDRS, CNC, and MHNG.

ETYMOLOGY: The species name refers to the fact that this species has been collected in Ecuador and on the equatorial line.

DIAGNOSIS: Among the Gelechiidae of the Galapagos this smallest of all species (2.5–2.9 mm forewing length) is most similar to *Agnippe omphalopa* (Meyrick) and *Ephysteris sporobolella* (see under Diagnosis of *A. omphalopa*). Among *Scrobipalpula* species this one is most similar in male genitalia to *S. dispar* (Povolný, 1990), **comb. n.**, described from Arequipa, Peru, on the basis of the spatulate gnathos, the long and thin phallus with a serrated flange subterminally, the elongate saccus, and especially, the simple median sacculus process. However, in *S. equatoriella* the median sacculus process is broader and shorter, as are the paired lateral sacculus processes, the apical margin of the uncus has additional lateral projections, and the valva has the curved distal section longer and thinner.

DESCRIPTION: *Male* (n=5) (Fig. 20). Head with ocelli, dorsally and anterad from antennae with lateral scales projected medially and slightly upward, forming low crest, appressed on fronto-clypeus; mostly cream, but laterally on fronto-clypeus with scales subapically tinged dark brown and dorsally with fewer scales subapically tinged lighter brown. Haustellum white. Labial palpus with palpomere 1 white, tinged with grey brown, palpomeres 2–3 ringed dark brown and white laterally, medially paler, with rings less distinct; palpomere 3 slightly shorter than 2nd; palpomere 2 with indistinct furrow ventrally. Antennal scape without pecten, mostly dark brown, with white base of some scales showing; flagellomeres mostly dark brown, with every second ring of scales showing slightly paler base. Thorax with mesothorax mostly cream, tinged with ochre laterally; tegula basally dark brown, apically ochre; postscutum with whitish-grey scales laterally; postscutellum greyish brown. Foreleg coxa mostly white at base, posteriorly mostly dark brown, with scales' base and apex white; femur as posterior

end of coxa; tibia dark brown with cream rings most prominent postmedially and apically; tarsomeres dark brown, with apical cream rings on I–IV. Midleg coxa and femur cream, with few brown scales; tibia dark brown with extensive cream rings before and after middle, and apically; tarsomeres as on foreleg. Hindleg coxa and femur as on foreleg; tibia mostly cream, including dorsal hair pencil, with dark brown at base, submedially, and subapically; tarsomere I as tibia, II–V as on midleg. Forewing length: 2.5–2.7 mm (Holotype: 2.7 mm). Forewing cream tinged with ochre below fold from base to 3/5; above fold mostly greyish brown, with more or less distinct diagonal cream bands at 1/5, 2/5, and 4/5, with dark brown dashes in fold at 2/5 and along midline at 3/5 and subapically (often less distinct), also with light ochre to brown at termen, as spot submedially, below costa as broken line, and in fold; fringe mottled with scales greyish brown subapically and white at base and apex. Hindwing blackish brown, becoming paler greyish brown on distal 1/3; costa with long, thin scales on whole length; fringe greyish brown on costa, paler greyish cream elsewhere. Abdomen dorsally dark greyish brown on first 2–3 segments, subsequently paler to dirty white on two distal segments; ventrally whitish cream along middle, greyish brown laterally; sternum VIII about 2 X length of VIIth but equal in width, with basal margin broadly concave, reinforced by narrow, strongly sclerotized band, with apical margin slightly rounded; tergum VIII slightly shorter than sternum, about 1/3 broader, basal and apical margins straight.

Male genitalia (n=2) (Figs 62, 63). Uncus squarish, dorsoventrally flattened, dorsal surface flat, without ornamentation, apical margin with short lateral extensions and broadly rounded medially. Gnathos spatulate, long, distal section less strongly sclerotized, with distal margin undulated. Tegumen long and moderately narrow, 4 X length of uncus, dorsal connection almost 2/3 length of tegumen, dorsally with broad and shallow postmedian depression; in dorsal view with lateral margins slightly rounded postbasally, constricted subapically; pedunculi moderately narrow. Valva narrow and long, slightly more than 1/10 shorter than tegumen + uncus, reaching tip of uncus; slightly curved downward near middle; distal half with short, sparse setation laterally and ventrally; distal 1/5 slightly dilated, curved inward at about half right angle; apex sharply pointed. Median sacculus process simple, reaching 1/3 length of valva, apically rounded, with tiny setae on two longitudinal rows ventrally and along apical margin. Lateral sacculus processes moderately wide at base, tapering, reaching apex of median process, laterally compressed toward dorsal margin, apex shortly pointed, directed upward, with 4–5 tiny setae before apex dorsally. Parabasal processes digit-like, about half as long as lateral sacculus processes, with short setae mostly at rounded apex. Vinculum short; saccus narrow, slightly shorter than vinculum + median sacculus process, with apex narrowly rounded. Phallus thin and long, slightly shorter than whole genital capsule, upcurved gently, with base slightly enlarged, with lateral flange on left side serrated from 3/4 to just before downcurved apical 1/10; apex without distinct cornutus.

*Female* (n=15) (Fig. 21): Antenna slightly thinner than male's. Frenulum with 3 acanthae. Forewing length: 2.6–2.9 mm; forewing colour slightly different than male's in more ochre sector below fold; hindwing uniformly greyish brown. Abdomen segment VII slightly more than 2 X length of VIth, with apical margins slightly concave.

Female genitalia (n=2) (Fig. 92). Papillae anales short, lightly sclerotized, setose. Posterior apophyses thin, straight and long, reaching ostium in extended position. Anterior apophyses straight, directed outward slightly, about 1/4 length of posterior apophyses and slightly thicker. Segment VIII ventrally lightly sclerotized, medially with wide section (2/5 of whole width) slightly projected ventrally as elongate triangle, covered with short spines; segment VIII dorsally with wide (3/5 of whole width) median section membranous, spinulose, with elongate, narrow pockets laterally at base and reaching 2/3 length of segment, covered with comb-like microsculpture of circles with thick margins, laterally with wider sclerotized bands without microsculpture but spinulose, narrowly prolonged subdorsally at apex and setose along apical margin. Ductus bursae long, posterior 3/5 strongly sclerotized, about 1/4 width of segment VIII, posterior 1/7 widely opening; anterior 2/5 membranous, slightly narrower; inception of ductus seminalis at 6/7 on ductus bursae. Corpus bursae tear shaped, about 1.4 length of ductus bursae; signum a thin pointed hook on left side at posterior 1/4.

**BIOLOGY:** The host plant is unknown. The moths are attracted to light and have been collected from December until April, at low elevations mostly, from sea level to 137 m above sea level.

**DISTRIBUTION:** Galapagos islands of Baltra and Santa Cruz.

**REMARKS:** The sexual dimorphism in forewing, slightly, and especially hindwing colour is also found, for example, in *Scrobipalpula patagonica* Povolný. However, in this species the darker scaling on the hindwing is in a band along the costa and in the anal sector at base (see Povolný 1987: 85; 1994: 21).

*Scrobipalpula caustonae* Landry, sp. n.

Figs 22, 64, 65

**HOLOTYPE:** ♂, 'ECU[ADOR].. GALAPAGOS | Floreana, Punta | Cormoran, 21.iv.1992 | M[ercury]V[apour]L[ight] | leg[it]. B. Landry', 'HOLOTYPE | Scrobipalpula | caustonae | B. Landry'. Specimen in good condition, not dissected. Deposited in the MHNG.

**PARATYPES:** 3 ♂ (2 dissected, slides MHNG ENTO 5360 and 5972), with same data as holotype. Deposited in the CDRS and MHNG.

**ETYMOLOGY:** This species honours Charlotte Causton, former head of Charles Darwin Station's Department of Invertebrates, who spent great efforts to plan, implement, and monitor the introduction of *Rodolia cardinalis* (Mulsant) (Coccinellidae) to control *Icerya purchasi* (Maskell) (Margarodidae) in the Galapagos, thus probably saving a few species of moths from extinction (Roque-Albelo, 2003).

**DIAGNOSIS:** This species is the only gelechiid in the Galapagos with white hindwings. The forewing pattern and colour are also unique among Galapagos gelechiids. It is close to *S. densata* (Meyrick, 1917), described from Peru, but also occurring in the Galapagos (see below), in several characters of the male genitalia such as the shape of the uncus, gnathos, valvae, saccular and parabasal processes, and phallus. It differs especially clearly in the shape of the phallus which has a shorter coecum penis and a larger subapical projection.

**DESCRIPTION:** *Male* (n=4) (Fig. 22). Head with ocelli, scale cover seemingly appressed (rubbed in available specimens), with lateral scales of posterior part of head



converging medially; colour apparently mainly white with small lateral and larger posterior scales apically or subapically brown. Haustellum and maxillary palpus white. Labial palpus mostly pale orange brown, with white dorsally and also laterally at tip of palpomere 2 and base and tip of palpomere 3; second palpomere ventrally with scales projecting at 45°, but not longer or forming furrow; palpomere 3 slightly shorter than 2nd. Antennal scape orange brown with apical white ring; flagellum beige with greyish-brown spot laterally and alternatingly on first few flagellomeres, with complete greyish-brown band in alternation on subsequent flagellomeres. Thorax white with orange brown to dark brown at apex of some scales; postscutellum white, shining. Foreleg coxa and femur white speckled with brown; tibia mostly brown with white at base, postmedially, and apically; tarsomeres white with brown postmedially on 1<sup>st</sup> and basally on 2<sup>nd</sup> to last. Midleg as foreleg but with more extensive white scaling, especially on femur. Hindleg as midleg, with brown markings slightly paler, orange tinged. Forewing length: 3.5–4.0 mm (Holotype: 4.0 mm). Base of forewing costa underneath with pencil of thin scales extending to about 1/5 wing length. Forewing colour creamy white with diffuse pattern of brown, mostly tinged orange lightly, with darker brown patches sub- and postmedially along midline; fringe light greyish brown. Hindwing white with light greyish-brown fringe. Abdomen dorsally white with stiffened and pointed, yellowish cream scales on terga I–III, but less modified on tergum 1; ventrally white; sternum VIII as narrow as preceding sternum, with straight basal margin and evenly convex apical margin; tergum VIII about 2/3 width and 1.5 length of sternum, broadly concave at base and roundly convex apically.

Male genitalia (n=2) (Figs 64, 65). Uncus slightly convex, short, with parallel lateral margins, rounded angles, and narrow, V-shaped cleft medially. Gnathos an upcurved plate with basal and lateral margins concave, with short arms, apically forming three short projections of equal length, one median and two lateral, rounded. Tegumen about 6 X length of uncus, dorsal connection half length of tegumen, laterally constricted subapically, pedunculi narrow. Valva slightly bent downward beyond middle, subapically enlarged, triangular, with rounded ventral point and apex; slightly shorter than tegumen and reaching before apex of uncus; with setation laterally on distal half, more sparse and shorter medially. Saccular processes stout and divergent, apically with short point directed laterally. Parabasal processes narrow and short, reaching slightly beyond saccular processes, apex slightly curved medially and with short setae. Vinculum very narrow. Saccus rounded, short, not reaching beyond margins of tegumen pedunculi. Phallus narrow, strongly sclerotized, straight but lateral margins slightly sinuate, about 2/3 length of whole genital capsule, with coecum penis distinct, narrow, at 45° from shaft, almost 1/3 length of whole phallus, apically forked with dorsal branch shorter and thicker than ventral one, latter pointed, slightly up-curved and directed to left.

*Female*: Unknown.

**BIOLOGY**: The host plant is unknown. The available specimens were collected at light near the sea shore.

**DISTRIBUTION**: Galapagos island of Floreana.

**REMARKS**: This species is attributed to *Scrobipalpus* because it is close to *S. densata* (Meyrick, 1917) (see Diagnosis). All known species of Neotropical

Gnorimoschemini and several Nearctic species were checked to make sure that this species was new.

*Symmetrischema* Povolný, 1967

The genus, including subgenera *Primischema* Povolný and *Symmetrischemulum* Povolný, includes 46 species in the Neotropical region (Povolný, 1994) and 7 in the Nearctic region (Lee *et al.*, 2009), with three known from both regions. The type locality mentioned for *S. capsica* (Bradley & Povolný, 1965) as England by Lee *et al.* (2009) is wrong as the species was described from the Lesser Antilles.

*Symmetrischema escondidella* Landry, sp. n.

Figs 23–26, 66, 67, 93

HOLOTYPE: ♂, 'ECU[ADOR], Galápagos, Santa Cruz | E[stacion]C[ientifica] C[harles]D[arwin], El Barranco | S 00° 44.291', W 90° 18.107' | 22 m elev[ation], u[ltra]v[iolet] l[ight], 23.iii.2006 | leg[it]. P. Schmitz'. 'HOLOTYPE | *Symmetrischema* | *escondidella* | B. Landry'. Specimen in good condition, with notch on right forewing apex, with right hindwing slightly out of place, not dissected. Deposited in the MHNG.

PARATYPES: 5 ♂, 6 ♀ from the Galapagos Islands, Ecuador. – *Floreana*: 1 ♀ (dissected, slide MHNG ENTO 5975), close to Loberia, GPS: elev[ation]. 6 m, S 01° 17.002', W 90° 29.460', 11.iv.2004, u[ltra]v[iolet]l[ight] (P. Schmitz). – *Pinzon*: 3 ♂ (one dissected, slide MHNG ENTO 5974), 2 ♀, Playa Escondida, S 00° 35.928', W 90° 39.291', 14 m elev., 27.iii.2006, uvl (P. Schmitz); 1 ♂, [no specific locality], S 00° 36.216', W 90° 40.033', 280 m elev., 28.iii.2006, uvl (P. Schmitz); 1 ♂ (dissected, slide MHNG ENTO 5976), 1 ♀, playa [sic] Escondida, 20.iv.2002, uvl (B. Landry, L. Roque). – *Plaza Sur*: 2 ♀ (one dissected, slide MHNG ENTO 5973), S 00° 34.980', W 90° 09.990', 18 m elev., 14.iv.2006, uvl (P. Schmitz). Deposited in the BMNH, CDRS, and MHNG.

ETYMOLOGY: The name derives from one of the collecting localities, Playa Escondida on Pinzon Island, which means "hidden beach" in Spanish. The species also remained 'hidden' from us despite extensive collecting efforts before it was first found in 2002.

DIAGNOSIS: The conspicuous black scales found on the male's hindwing on the basal half (Fig. 23) are unique among the Gelechiidae of the archipelago and rare in Lepidoptera altogether. This character is found also in *Symmetrischema disciferum* Povolný, 1989 and in *Scrobipalpula patagonica* Povolný (see Povolný (1994: 21)), but in the first species the black scales cover the whole basal half of the wing and in the second they are found only along the costa's basal 3/4 and in the anal sector. In male genitalia our species differs from other *Symmetrischema* species by a combination of characters such as the narrow valva with a short triangular point submedially, the wide paired saccular processes with a more elongate dorsal projection, and the very tiny parbasal processes. This general shape of the male genitalia is found also in *S. lectuliferum* (Meyrick), described from Texas, USA, and illustrated by Povolný (1967: 57), but in this species the valvae are thicker, especially medially, and the phallus is longer, thinner, and mostly serrated on one side.

DESCRIPTION: *Male* (n=5) (Figs 23, 25, 26). Head with ocelli, scale cover appressed, with scales of posterior part of head converging medially and scales of anterior part converging medioanteriorly; colour of scales dirty white at base, dark to light greyish brown subapically, and pure white at tip. Haustellum white. Maxillary palpus coloured as head, with scales subapically dark greyish brown. Labial palpus

curved upward, not quite reaching top of head; segment I white; segment II mostly coloured as head, but white dorsally, with ventral scales forming median furrow; segment III coloured as 2<sup>nd</sup>, but with faint paler rings medially and subapically with scales subapically pale brown. Antennal scape without pecten, mostly black with scales dirty white at base and tip, with creamy white apical ring; flagellum at base with alternating rings of black and beige, distally with 5 series of 3 black rings followed by 1 beige ring, followed at tip by 1 black and 1 beige rings. Thorax mostly with scales coloured as on head, but darker anteriorly and with chestnut brown in middle of tegulae; postscutellum grey, shining. Foreleg coxa with scales tricoloured as on head, with black median area of scales small; femur as coxa, but black on scales more prominent; tibia mostly black, with white bands submedially, postmedially, and apically; tarsomere I black, with beige at base and tip; tarsomeres II and V black with beige at tip; tarsomeres II and III black. Midleg coxa beige; femur as on foreleg but more prominently beige, especially at base; tibia as on foreleg, but paler sections of scales more prominent, with white bands postmedially and apically; tarsomeres as on foreleg. Hindleg coxa beige; femur mostly beige, with some greyish brown; tibia as on midleg, but with base mostly beige; tarsomere I black with three beige bands at base, middle, and apex; tarsomeres II–V black at base and beige at tip. Forewing length: 3.57–4.05 mm (Holotype: 3.95 mm). Forewing upper side appearing dark brown, with most scales tricoloured except black ones forming diagonal patch on costa to midline at 1/4, three dashes increasing in length just above midline before and after middle and at 4/5, and 3–4 smaller spots at and near base; also with chestnut-brown scaling forming 4 longitudinal lines above midline at 1/3 and between 1/2 and 4/5, patches before and after middle along midline, patch along fold at 1/3, as longitudinal line above dorsum between 1/4 and 3/5, and following faint transverse pale line at 2/3; fringe pale greyish brown; underside of wing (Fig. 26) with black scaling between 1/5 and 2/3. Hindwing greyish brown with concolourous fringe and black scaling from slightly beyond base to 2/3 along costa and to 1/2 along dorsum except along medial fold and in oval area at base of anal sector; costa with thin beige and black scales slightly longer than hair-like scales of fringe from base to 2/5; underside also with black scaling mostly along costa from 1/5 to 3/5 and in cubital sector. Abdomen greyish brown with apical row of dirty white scales on most segments except first two and above genitalia; on each side of genitalia with short tuft of thin beige scales projecting upward at 45°; laterally and ventrally dirty white with row of dark brown spots on each side of midline ventrally, with greyish-brown scales in middle of penultimate segment and under genitalia; sternum VIII almost 2 X length of sternum VII, with basal margin shallowly concave and apical margin broadly rounded; tergum VIII about as long as sternum, with basal margin reinforced by thin sclerotized band, broadly concave, with apical margin straight.

Male genitalia (n=2) (Figs 66, 67) Uncus a rather narrow band, 1/6 length of tegumen, with basal and apical margins rounded in parallel, well separated from more lightly sclerotized tegumen. Circumanal membrane strongly developed, forming broad V, with ventral branches of V strongly sclerotized, abundantly scobinated. Gnathos a short, narrow, and straight point attached medially on centrally fused thicker arms. Tegumen dorsally flat, dorsal connection 1/2 total length but with basal 1/4 more strongly sclerotized, subapically constricted and then enlarging slightly. Valva narrow,

subapically enlarged slightly, then narrowing, apically narrowly rounded; reaching middle of gnathos; evenly curved downward and laterally; with short triangular point medially at middle; with short to long setae on distal half mostly ventrally. Paired saccular processes wide, closely approximate ventrally, with short, glabrous ventral projection separated by broadly rounded concavity to shortly setose, digitate projection reaching slightly beyond middle of valva. Paired parabasal processes very tiny, narrow, with one apical seta. Unpaired saccular process short, not quite reaching tips of ventral projections of paired saccular processes, apically blunt. Vinculum short, with lightly sclerotized, rounded dorsal margins and strongly sclerotized reinforced ventral margins; saccus moderately long and narrow, slightly upturned and blunt at proximal end. Phallus narrow, slightly longer than valva, slightly curved to right, with distinct, slightly enlarged and rounded coecum, apically with short, dorsal, lightly sclerotized, digit-like projection, ventrally with apical margin shallowly concave medially with rounded sides.

*Female* (n=6) (Fig. 24): Antenna and colour as in male. Frenulum with 3 acanthae. Forewing length: 3.62–4.52 mm. Both fore- and hindwings without black scaling or long scales at base of hindwing costa as found in male. Abdomen segment VII twice as long as preceding, narrower and narrowing, with apical margins slightly concave.

Female genitalia (n=2) (Fig. 93). Papillae anales subtriangular, apically rounded, lightly sclerotized, moderately setose. Posterior apophyses thin, straight, and long, 3.2 X length of anal papillae, reaching ostium in full extension. Anterior apophyses thin, straight, about 2/5 length of posterior ones. Membrane at midpoint between segment VIII and papillae anales with large, rounded dorsal extension 1/3 longer and wider than distance between posterior apophyses at that point. Segment VIII with strongly sclerotized, straight anterior margin; with intersegmental membrane lightly sclerotized along anterior margin medially and lateroposteriorly, with spicules on strictly membranous median section distally; ostium in circular membranous area medially adjacent to anterior margin of segment; laterally with sclerotized areas extending posteriorly, narrowing, not completely enclosing membranous area around ostium, forming pair of medially opened, heavily spinulate cavities near middle of segment, ending laterally in bands; membrane between lateral sclerotized areas less densely spinulate. Ductus bursae with short sclerotized section posteriorly, with dorsal inception of ductus seminalis, subsequent section about as long as segment VIII, posteriorly straight, anteriorly curved with narrow sclerotized triangle adjacent to small, strongly sclerotized patch. Corpus bursae narrow, curved, gradually enlarging to anterior section about twice as wide, distally rounded.

**BIOLOGY:** The host plant is unknown. The moths come to light and specimens have been collected near the sea shore, but also up to 280 m, in March and April.

**DISTRIBUTION:** Galapagos islands of Floreana, Pinzon, and Plaza Sur.

**REMARKS:** The keys provided by Povolný (1994) for the Neotropical genera place this species in *Symmetrischema* s. str. for the males while it leads to a dead end for the females. Our new species can be quite confidently associated with *Symmetrischema* because in male genitalia it bears an unpaired process arising from the centre

of the sacculus wall ventrally, which is the first character mentioned in the original description (Povolný, 1967) to 'characterize' the genus. The second 'specific character' mentioned by Povolný (1967) is the apically enlarged valvae, but this is 'probably secondarily narrowed' in some species, such as *S. escondidella*. The gnathos of *Symmetrischema*, as mentioned by Povolný (1967) is 'either reduced to form a mere chitinous half-ring... or transformed to a short triangular beak,' the latter being the condition observed in our new species. Finally, as found in our species, the circumanal membrane (scaphium and subscaphium) is often strongly developed, often reaching beyond the uncus. In female genitalia the only character mentioned in the original description as being 'characteristic' for the genus is the tendency toward a reduction of the signum bursae, which is completely absent in our new species. All North American and Neotropical species of *Symmetrischema* were checked to determine that our species was new.

## Litini

### *Agnippe* Chambers, 1872

Genus *Agnippe*, including *Evippe* Chambers, just synonymized by Lee & Brown (2008) includes 23 species occurring in North America, Europe, and Asia according to Lee & Brown (2008). However, these authors did not record *A. omphalopa* (Meyrick) and four other Neotropical species mentioned by Becker (1984), although they mentioned that *Tholerostola* Meyrick, the genus in which and for which *omphalopa* was described, is a synonym of *Agnippe*.

The description of *Agnippe* provided by Lee & Brown (2008) differs significantly in several characters when *A. omphalopa* is taken into consideration.

Recorded host plants for *Agnippe* species are in the Fabaceae, Fagaceae, and Rosaceae (Lee & Brown, 2008). Thus, our host plant record for *A. omphalopa* is not surprising.

*Agnippe omphalopa* (Meyrick, 1917), comb. n.

Figs 27, 28, 68, 69, 94

*Tholerostola omphalopa* Meyrick, 1917: 40, 41. – Meyrick, 1925: 88. – Clarke, 1969b: 476, pl. 238 figs 1–1d.

*Evippe omphalopa* (Meyrick). – Becker, 1984: 45.

MATERIAL EXAMINED: 11 ♂, 11 ♀. Male lectotype (dissected, slide 6244, Clarke), described from "Ecuador, Duran, low country" (BMNH). – *Isabela, Sierra Negra*: Puerto Villamil: 1 km W Puerto Villamil; 2 km W Puerto Villamil; 8.5 km N Puerto Villamil. – *Pinta*: Playa Ibbeston [sic]; ±15 m elev.; ±50 m elev. – *Pinzon*: ±25 m elev. Deposited in the BMNH, CDRS, CNC, and MHNG.

DIAGNOSIS: A tiny moth (forewing length: 2.7–3.2 mm) that resembles perhaps only two other similarly small gelechiid species of Galapagos: 1- *Scrobipalpus equatoriella* sp. n. has pale off-white scaling on the head, thorax, genitalia, and dorsum of forewing and the male hindwing is deep dark brown, especially at base; and 2- *Ephysteris sporobolella* sp. n., which often has the base of the forewing dorsum paler than the adjacent, costal part of the wing, which is usually contrastingly darker, and the base of the forewing subcostal vein has an overlay of orange-ochre scales. Among the other species of *Agnippe*, *A. omphalopa* is one of two described from the Neotropical region that do not have the dorsum of the forewing mostly white and contrasting with

dark brown or black. The other species, *A. plumata* (Meyrick, 1917) is darker, blackish brown with some bronze, shining scales (but whole type series severely rubbed) (see Clarke, 1969b: 89, pl. 44), compared to *A. omphalopa*, its costal part of valva is shorter, apically narrowing and sparsely setose, and its phallus apically shows a narrow, sclerotized band curved onto itself.

ADDITIONS TO ORIGINAL DESCRIPTION: *Male* (n=11) (Fig. 27): Head without ocelli. Scape without pecten. Forewing length: 2.7–3.1 mm. Tergum VIII wider and more strongly sclerotized than tergum VII, with apical margin broadly produced and rounded, without associated hair pencil. Sternum VIII at base about half as wide as sternum VII and altogether almost 3 X as long; gradually tapering from base until middle then more strongly so until short apical widening; apically blunt, with tiny median depression.

Male genitalia (n=3) (Figs 68, 69). Uncus basally wider, gently tapering to blunt apex, latter slightly down curved. Gnathos with dorsal, spatulate part slightly wider and longer than uncus, very thin, down curved; ventral part about as wide and as long as uncus, straight except for simple, short, rounded and flattened tip upturned at right angle. Tegumen about 1/5 longer than uncus, with pedunculi moderately wide, with dorsal sclerotized bridge 3/10 of whole length. Costal part of valva with wide base, narrow in middle, with apex enlarged and densely setose medially; saccular part of valva asymmetrical: on right side forming tiny, curved 'claw,' on left side forming digitate peduncle projecting upward to costal margin of costal part of valva, then with long, laterally flattened 'sword' directed ventrally, reaching apex and ventral margin of costal part of valva, without setae, apically pointed and slightly turned medially. Vinculum's posterior margin slightly asymmetrical, rounded, with few, tiny setae laterally more apically situated on right side; saccus asymmetrical, with left branch about 1/5 longer than right branch, lightly sclerotized between branches apically. Phallus elongate, index finger-like, with longitudinal, strongly sclerotized, narrow bar along ventral edge from 2/5 till before apex; vesica without cornuti.

*Female* (n=11) (Fig. 28): Antenna slightly thinner than male's; colour and forewing pattern as in male; frenulum with 3 acanthae; forewing length: 2.7–3.2 mm. Tergum VII unmodified. Apical margin of sternum VII with median concavity nearly reaching middle of sternum.

Female genitalia (n=2) (Fig. 94). Papillae anales lightly sclerotized, with short to long setae, especially along basal and dorsal margins and apically. Posterior apophyses thin, straight, about 2 X as long as anterior apophyses, reaching middle of antrum in full extension. Anterior apophyses more strongly sclerotized than posterior, reaching posterior margin of segment VI. Antrum situated medially, funnel shaped, about half as long as segment VII at lateral, longest point. Ductus bursae narrower and half as long as antrum. Corpus bursae with slightly elongate, main section containing broad, flattened, convex, and irregularly rounded signum with short median crest, also with band of spinules before posterior end; accessory bursa longer, narrower, curving anteriorly to surround anterior end of main section, with spinules along most of posterior half.

BIOLOGY: The two specimens from Pinzon Island were reared from immatures collected in leaflets of *Prosopis juliflora* (Sw.) DC. (Fabaceae). This small tree or shrub

is found on several islands of the archipelago and considered native (Lawesson *et al.*, 1987). It is an inhabitant of the arid lowlands and although it originated from South America, it is now widespread in tropical regions around the world (McMullen, 1999). Moths come to light and were collected in March and April in the arid zone of the Galapagos.

**DISTRIBUTION:** Described from continental Ecuador, and here mentioned from the Galapagos archipelago (Isabela, Santa Cruz, and Santa Fe) for the first time. It is undoubtedly more widespread in the archipelago and elsewhere.

**REMARKS:** The type series of *A. omphalopa* consisted of nine specimens (Meyrick, 1917). Clarke (1969b) designated a lectotype, recorded seven other syntypes, and gave illustrations of the habitus, head, wing venation, and male genitalia. The Galapagos specimens were identified by comparison with the lectotype.

## Anacampsis

### *Anacampsis* Curtis, 1827

This is a relatively large genus with 34 species recorded from the Neotropics (Becker, 1984), 23 from the Nearctic Region (Lee *et al.*, 2009), 9 in Europe (Karsholt & Riedl, 1996), 2 in South Africa (Vári *et al.*, 2002), and 2 in India and Sri Lanka (Meyrick, 1925). Host plants are in a wide variety of families such as Betulaceae, Rosaceae, and Salicaceae in the Holarctic region and Anacardiaceae, Combretaceae, Euphorbiaceae, Fabaceae, and Malvaceae in the Neotropical region (Robinson *et al.*, 2007).

### *Anacampsis primigenia* Meyrick, 1918

Figs 29–32, 70–72, 95

*Anacampsis primigenia* Meyrick, 1918: 141. – Clarke, 1969a: 238, pl. 118 figs 2–2a. – Becker, 1984: 48.

**MATERIAL EXAMINED:** 44 ♂, 61 ♀, 18 of unrecorded sex. Male lectotype, described from ‘Huigra, 4,500 feet, Ecuador, Parish.6.14’ (BMNH). – *Española*: bahía Manzanillo: Las Tunas Trail, 100 m elev. – *Fernandina*: SW side, 815 m elev., S 00° 21.270’, W 091° 35.341’; SW side, crater rim, 1341 m elev., S 00° 21.910’, W 091° 34.034’; N side, 1300 m elev. – *Floreana*: Las Cuevas; close to Loberia, 6 m elev., S 01° 17.002’, W 90° 29.460’; Finca Las Palmas, 300 m elev.; scalesias near Cerro Pajas, 329 m elev., S 01° 17.743’, W 90° 27.111’; Cerro del Asilo, 366 m elev., S 01° 18.931’, W 90° 27.232’. – *Genovesa*: Bahía Darwin. – *Isabela*, *Alcedo*: [West side], bahía Urvida ex larva en *Croton scouleri*; lado NE, 200 m elev., camp arida alta; NE slope, 292 m elev., S 00° 23.829’ W 91° 01.957’; lado NE, 400 m elev., camp pega-pega; lado NE, 700 m elev., camp guayabillos; 900 m elev.; lado NE, 1100 m elev., cumbre, caseta Cayot. – *Isabela*, *Darwin*: Tagus Cove; [W slope] 300 m elev.; [W slope] 630 m elev. – *Isabela*, *Sierra Negra*: 1 km W Puerto Villamil; 2 km W Puerto Villamil; 8.5 km N Puerto Villamil; 11 km N Puerto Villamil; ±15 km N Puerto Villamil; 3 km N Santo Tomas, Agriculture Zone. – *Marchena*: [no specific locality]; Playa Negra. – *Pinta*: Cabo Ibbetson, N 00° 32.819’, W 90° 44.229’; 200 m elev.; 400 m elev.; 421 m elev., N 00° 34.591’, W 90° 45.137’. – *Pinzon*: Playa Escondida, S 00° 35.928’, W 90° 39.291’. – *Rabida*: tourist trail. – *San Cristobal*: Puerto Baquerizo; 2 km SW Puerto Baquerizo; 4 km SE Puerto Baquerizo; base of Cerro Pelado; mina de ripio, en *Croton scouleri*. – *Santa Cruz*: littoral zone, Tortuga Bay; bahía Conway; Charles Darwin Research Station; Barranco, arid zone; transition zone, house of L. Roque, 137 m elev., S 00° 42.595’ W 90° 19.196’; low agriculture zone, S 00° 42.132’, W 90° 19.156’; 2 km W Bella Vista; finca Steve Devine; finca Vilema, 2 km W Bella Vista; NNW Bella Vista, 225 m elev., S 00° 41.293’, W 90° 19.665’; agriculture zone, finca C. Troya, N Bella Vista, 294 m elev., S 00° 40.756’, W 90° 18.671’; Tortuga Reserve, W Santa Rosa; Los Gemelos; pampa zone, Media

Luna. – *Santa Fe*: tourist trail. – *Santiago*: Bahía Espumilla; La Bomba, 6 m elev., S 00° 11.151' W 90° 42.052'; N side, 437 m elev., S 00° 13.316' W 90° 43.808'; 200 m elev.; Aguacate, 520 m elev.; Central, 700 m elev.; Jaboncillo, ±850 m elev. – *Seymour Norte*: arid zone; [no specific locality]. – *Sombrero Chino*: ex larva en frutos de *Cacabus miercii* [sic]. – *Wolf*: N 01° 23.380', W 91° 49.201'. Deposited in the BMNH, CDRS, CNC, and MHNG.

DIAGNOSIS: Many species of *Anacamptis* have a look similar to that of *A. primigenia*. Our species is perhaps more similar to *A. capyrodes* Meyrick, especially in size, although this species has darker, chocolate-brown fore- and hindwings and a more uniformly coloured forewing with a very faint, paler postmedian line. Given its rather large size and dark brown wings this species is unlike any other in the Galapagos.

ADDITIONS TO ORIGINAL DESCRIPTION: *Male* (n=44) (Figs 29, 31): Scape without pecten. Ocelli present. Forewing length: 4.5–6.4 mm. Forewing pattern sometimes with more apparent dark brown markings as spots (Fig. 31), longitudinal lines (Fig. 32), or with distinctly paler costal area (Fig. 30). Hindwing without hair pencil on costa. Tibia with dense scale tuft dorsally. Segment VII unmodified.

Male genitalia (n=5) (Figs 70–72). Uncus strong, slightly down curved, slightly narrowing toward apex, with short point apically, with abundant, long setation. Gnathos absent. Tegumen strong, slightly convex, with wide arms at almost right angle from dorsal part, about 2/3 length of dorsal part, with short, thin scales dorsally on distal 2/3. Valva narrow, laterally compressed, slightly downcurved subbasally, with basal 2/5 wider, apical 1/10 slightly upturned, with moderate setation, medially at base with some setal bases slightly projecting, apically narrowing and rounded. Vinculum a pair of narrow lateral rods about half as long as valvae, with membrane in between dorsally forming pair of short rounded projections adorned with abundant setation of variable length: saccus short, about 1/3 length of lateral rods, an elongate V with lateral margins more strongly sclerotized and slightly concave, with anterior end blunt to narrowly rounded. Membrane all around phallus with abundant short setation. Phallus short, about half as long as valva, with basal half enlarged slightly, and apical half a narrow tube; in lateral view with ventral margin slightly convex, in middle with short hook projecting anteriorly, dorsal margin dropping half way in middle and then running parallel to ventral margin; in dorsal view with lateral margins postbasally projecting slightly, rounded until about mid-length, with left margin more distinctly narrowing than left margin, latter more strongly sclerotized.

*Female* (n=61) (Figs 30, 32): Antenna, colour, and forewing pattern as in male; forewing length: 4.3–6.6 mm; frenulum with three acanthae; tibia with scale tuft not as strongly developed as that of male. Segment VII about twice length of preceding; sternum narrower and laterally more strongly sclerotized than tergum, with median depression apically.

Female genitalia (n=4) (Fig. 95). Papillae anales slightly elongate, with longer and thicker setae at base along dorsal and ventral narrow sclerotized bands. Posterior apophyses narrow, straight, about 2x longer than papillae anales. Intersegmental membrane forming wide, rounded projection dorsally, longer and wider than papillae anales. Anterior apophyses straight, narrow, about 3/4 length of posterior ones. Segment VIII narrowly sclerotized along base dorsally, with narrow sclerotized bands not touching medially, medially with spoon-shaped structure slightly projecting



ventrally from between narrow basal sclerotized bands until apex of segment, strongly sclerotized only along perimeter, apparently with tiny hole connecting with abdominal cavity medially at base; laterally with sclerotized area extending ventroposteriorly in band reaching posterior end of segment, but not touching other side ventromedially, with circular gap posterior to bases of anterior apophyses. Ostium bursae medio-ventrally in membranous area at base, just anterior to tiny sclerotized crescent. Ductus bursae narrow, entirely membranous, about as long as anterior apophyses. Corpus bursae large, about 2.4 X length of ductus bursae, potato shaped, with signum at posterior 1/3 followed posteriorly with rounded projection of corpus wall, spiculate on posterior part of projection and around it posteriorly and laterally; signum small, with eye-shaped base and short, finger-like, posteriorly directed projection; ductus seminalis from just anterior to signum.

**BIOLOGY:** This species was reared on *Croton scouleri* Hook. f. (Euphorbiaceae) as well as on *Exedeconus miersii* (Hook. f.) D'Arcy (Solanaceae), both endemic to the Galapagos. In the case of *E. miersii* caterpillars were feeding on the fruits. The moth comes to light, and specimens have been collected in all months of the year between the sea shore and the highest elevations, for example at 1341 m on the rim of the caldera of Fernandina.

**DISTRIBUTION:** Described from Cali, Colombia, and Huigra, Ecuador, this species is reported here for the first time since the original description. It is very widespread in the Galapagos, occurring on the islands of Española, Fernandina, Floreana, Genovesa, Isabela, Marchena, Pinta, Pinzon, Rabida, San Cristobal, Santa Cruz, Santa Fe, Santiago, Seymour Norte, Sombrero Chino, and Wolf.

**REMARKS:** The absence of a gnathos in this species makes it stand apart from the European species of the genus (see Elsner *et al.*, 1999). The presence of a spoon-shaped structure dorsally on segment VIII of the female is curious, but also found in European species (see Elsner *et al.*, 1999); possibly it serves to disperse pheromones.

### *Compsolechia* Meyrick, 1918

This is a large genus mostly represented in the Neotropical Region by 113 species (Becker, 1984). There is also one species in the Nearctic Region (Lee *et al.*, 2009) and some in Japan (Beccaloni *et al.*, 2003). The name is regarded as a synonym of *Anacampsis* Curtis by Vári *et al.* (2002). Host plants of *Compsolechia* species are recorded in the Krameriaceae, Melastomataceae, Rhizophoraceae, and Vochysiaceae (Robinson *et al.*, 2007), and *Compsolechia meibomiella* Forbes, 1931, was named from the host plant of the syntypes, *Meibomia*, a synonym of *Desmodium* Heist. ex Fabr. (Fabaceae).

### *Compsolechia salebrosa* Meyrick, 1918

Figs 33, 73, 96

*Compsolechia salebrosa* Meyrick, 1918: 140. – Meyrick (1925: 120); Clarke (1969a: 501, pl. 249 figs 2–2b); Becker (1984: 48).

**MATERIAL EXAMINED:** 31 ♂, 5 ♀, 3 of unrecorded sex. Male lectotype: 'Caldas, 4,400 feet, Colombia, Parish .5.14', Slide No. 5926 (BMNH). – *Fernandina*: SW side, 815 m elev., S 00° 21.270', W 091° 35.341'; North Side, 300 m, en yemas florales de *Desmodium canum* [sic]. – *Floreana*: Las Cuevas; close to Loberia, 6 m elev., S 01° 17.002', W 90° 29.460'; Cerro

del Asilo, 366 m elev., S 01° 18.931', W 90° 27.232'. – *Isabela, Darwin*: Tagus Cove; [W slope] 300 m elev.; [W slope] 1000 m elev.; 1200 m elev. – *Isabela, Sierra Negra*: 8.5 km N Puerto Villamil; 11 km N Puerto Villamil: ± 15 km N Puerto Villamil. – *Pinta*: arid zone; 200 m elev.; 372 m elev., N 00° 34.476', W 90° 45.102'; 400 m elev. – *Pinzon*: Playa Escondida. – *San Cristobal*: 1 km S El Progreso; transition zone, SW El Progreso, 75 m elev., S 00° 56.359', W 89° 54.800'; antiguo botadero, ca. 4 km SE Puerto Baquerizo, 169 m elev., S 00° 54.800', W 089° 34.574'. – *Santa Cruz*: Charles Darwin Research Station; CDRS, wall of Invertebrates Lab., 11 m elev., S 00° 44.478', W 90° 18.132'; CDRS, Barranco, 20 m elev.; low agriculture zone, S 00° 42.132', W 90° 19.156'; transition zone, recently cut road, S 00° 42.528', W 90° 18.849'; agriculture zone, finca C. Troya, N Bella Vista, 294 m elev., S 00° 40.756', W 90° 18.671'. Deposited in the BMNH, CDRS, CNC, and MHNG.

DIAGNOSIS: This species is similar in general coloration to *C. lingulata* Meyrick, 1918, but the latter has no markings in the basal half of the forewing, except for the basal black spot on costa; its first costal marking is a postmedian, outwardly oblique black dash followed by white and black (see Clarke, 1969a: 488). *Compsolechia salebrosa* is similar in colour and pattern also to *C. succincta* Walsingham, 1910, described from Mexico, of which the holotype has no abdomen. *Compsolechia ptochogramma* Meyrick, 1922, is somewhat similar in colour to *C. salebrosa*, but it has fewer markings as a wide oblique dash from the base of the anal margin to above the fold, and a wide spot on costa subapically with a pair of short black streaks below, with white scales above and below the streaks. *Compsolechia meibomiella* Forbes, 1931, described from Cuba, is also similar to *C. salebrosa* in forewing pattern, but the subterminal line is closer to the middle of the wing, straighter, and more conspicuously bordered by black on its proximal side.

In the Galapagos this grey species with black and white forewing markings cannot be confused with any other, especially with regards to the medially dented postmedian line separating a paler apical section.

ADDITIONS TO ORIGINAL DESCRIPTION: *Male* (n=31) (Fig. 33): Scape without pecten. Ocelli present. Forewing length: 3.6–5.0 mm. Hindwing without hair pencil on costa, but latter slightly depressed near middle. Tibia with short scale tuft dorsally. Segment VII unmodified.

Male genitalia (n=3) (Fig. 73). Uncus compact, 1/3 length of tegumen, triangular in dorsal view, with short knob-like apex, dorsally with abundant setation of variable length, ventrally with short arms connecting with basal arms of gnathos. Gnathos with strongly sclerotized curved and short arms supporting large, strongly sclerotized egg-shaped ring with ventral, lightly sclerotized bulge inside ring. Tegumen bulky, with dorsal margin straight except slightly bulbous subapically, with two basal arms about as long as dorsal connection, with proximal ends of arms rounded and slightly curved downward, dorsally on bulbous part with short setae. Valva short, about as long as tegumen + uncus, narrow at base, ending in enlarged dorsal projection. Parbasal process thin, about half as long as valva, with few short setae toward apex medially. Vinculum poorly developed, ventrally leaving phallus mostly free, except at base, setose dorsally and laterally towards apex. Phallus bulky, about as long as whole genital capsule without phallus, not very strongly sclerotized, wide at proximal end, evenly narrowing to half basal girth, apically open ventrally and rounded; vesica with narrow cornutus about 1/4 length of phallus and ending in short ventral hook, partly spiculose.

*Female* (n=5): Antenna thinner than that of male; tibia, colour, and forewing pattern as in male; forewing length: 3.4–4.3 mm; frenulum with three acanthae. Segment VII about twice length of preceding, narrower, but not otherwise modified.

*Female genitalia* (n=2) (Fig. 96). Papillae anales almost circular, rather short, with narrow basal sclerotized bands wider dorsally, not connecting either dorsally or ventrally. Posterior and anterior apophyses narrow and straight, the latter slightly shorter. Segment VIII short, about 1/4 length of anal papillae, sclerotized only laterally and dorsally, forming basal narrow continuous band dorsally, with circular gaps of sclerotization at bases of anterior apophyses. Ostium bursae ventrally at base of segment VIII medially, without associated sclerotization. Ductus bursae very long, with posterior 1/5 very narrow, unsclerotized, lightly spiculate, median 3/5 narrow, unsclerotized, with spermatophore forming about 8 twists in both dissected specimens. Corpus bursae not clearly demarcated from ductus at first, elongate rounded, about 3/5 length of ductus, the two structures together longer than first seven abdominal segments, without signum, entirely spiculate, with short bulge near posterior end; inception of ductus seminalis at widest diameter, near anterior 1/4.

**BIOLOGY:** The larva was reared from flower buds of *Desmodium incanum* DC (Fabaceae) sampled on Fernandina. This is a native plant to the archipelago that also occurs in tropical areas around the world, although its origin is in tropical America (McMullen, 1999). The moth comes to lights and specimens have been collected from close to sea level to 1200 m in elevation during the months of February until May, and in October.

**DISTRIBUTION:** This species is widespread in the Galapagos. It has been found on the islands of Fernandina, Floreana, Isabela, Pinta, Pinzon, San Cristobal, and Santa Cruz. It is reported here from the first time since its description, which was based on specimens from Colombia and Guyana.

**REMARKS:** There is a possibility that *C. salebrosa* is a synonym of *C. succincta* Walsingham, 1910, but since the holotype of the latter has no abdomen, it may not prove possible to establish this fact. A revision of the entire genus would be more appropriate than here to solve this problem.

### *Mesophleps* Hübner, 1825

The Galapagos species, *Mesophleps adustipennis* (Walsingham), is the only representative of the genus in the Western Hemisphere (K. Sattler, pers. comm. to BL). It differs from *M. palpigera* (Walsingham), described from Mozambique, under which it was cited as a synonym by Forbes (1930), Becker (1984), and Lee *et al.* (2009) (see Diagnosis below). The synonymy of *Brachyacma* Meyrick, 1886 and *Mesophleps* was mentioned in Karsholt & Riedl (1996: 312). The generic combination '*Mesophleps adustipennis*' hasn't been used so far. It was graciously provided by Klaus Sattler (pers. comm. to BL), who is working on a revision of the genus.

The species of *Mesophleps* feed on Fabaceae, Dipterocarpaceae, and Rubiaceae (see Robinson *et al.*, 2007).

*Mesophleps adustipennis* (Walsingham, 1897), **comb. n.**

Figs 34, 74, 97

*Lathontogenus adustipennis* Walsingham, 1897: 88.

*Brachyacma palpigera* (Walsingham, 1891). – Forbes, 1930: 123. – Becker, 1984: 50).

? *Lipatia crotalariella* Busck, 1910. – Forbes, 1930: 123.

**MATERIAL EXAMINED:** Syntype ♂ from Grenada, dissected (label data not recorded). 3 ♂ (2 dissected), 38 ♀ (6 dissected) collected on the Galapagos Islands. – *Española*: Bahía Manzanillo; Punta Suarez. – *Floreana*: Las Cuevas; close to Loberia, 6 m elev., S 01° 17.002', W 90° 29.460'; Cerro del Asilo, 366 m elev., S 01° 18.931', W 90° 27.232'. – *Isabela*, *Sierra Negra*: 2 km W Puerto Villamil. – *Marchena*: [no specific locality]. – *Pinzon*: Playa Escondida, 14 m elev., S 00° 35.928', W 90° 39.291'. – *San Cristobal*: 4 km, SE Puerto Baquarizo [sic]; near Loberia, elev. 14 m, S 00° 55.149', W 89° 36.897'; transition zone, SW El Progreso, elev. 75 m, S 00° 56.359', W 89° 32.906'; antiguo botadero, ca. 4 km SE Puerto Baquerizo, 169 m elev., S 00° 54.800', W 89° 34.574'. – *Santa Cruz*: Estacion Cientifica Charles Darwin [ECCD]; ECCD, El Barranco, 22 m elev., S 00° 44.291', W 90° 18.107'; Finca S[teve]. Devine; transition zone, recently cut road, S 00° 42.528', W 90° 18.849'; low agriculture zone, S 00° 42.132', W 90° 19.156'; Finca Vilema, 2 km W Bella Vista; Los Gemelos. – *Santiago*: La Bomba, 6 m elev., S 00° 11.151', W 90° 42.052'; N side, 437 m elev., S 00° 13.316', W 90° 43.808'; 200 m elev. Deposited in the BMNH, CDRS, CNC, and MHNG.

**DIAGNOSIS:** Externally this species is very similar to *Mesophleps palpigera* (Walsingham), but segment II of the labial palpus in *M. adustipennis* has a stronger dorsal tuft, is triangular in lateral view, in cross-section oval, and distally twice as thick as at the base whilst in *M. palpigera* it is round in cross-section and distally not much thicker than at base. The male genitalia of *M. adustipennis* differ in the round uncus (subrectangular in *M. palpigera*) and shorter, stouter gnathos hooks (K. Sattler, pers. comm. to BL). *Mesophleps adustipennis* is also the only species of the genus in the Western Hemisphere (K. Sattler, pers. comm. to BL).

In the Galapagos this species is most similar in size and colour to *Sitotroga cerealella* (Olivier) and *Dichomeris acuminatus* (Staudinger). It differs from them in the presence of a dark brown band along the costa from the middle of the forewing. Galapagos specimens vary substantially in size from 4.4 to 6.9 mm in forewing length in males, and 4.4 to 8.1 mm in females.

**BIOLOGY:** In the Galapagos the species has been reared from fruits of *Prosopis juliflora* (Sw.) DC. (specimen in CDRS) (Fabaceae) and from *Leucaena leucocephala* (Lam.) de Wit, the lead tree (Fabaceae), on Santa Cruz by M.-L. Johnson (specimens in Australian National Insect Collection, Canberra). If *M. crotalaria* (Busck, 1910) is a synonym of *M. adustipennis*, then the caterpillar has been recorded to feed also in *Crotalaria* pods (Fabaceae) (Forbes, 1930). Moths come to light and specimens have been collected from January until May and in September, October, and December mostly near sea level but also until 580 m in elevation (Los Gemelos) on the Galapagos.

**DISTRIBUTION:** Widely spread in the Galapagos archipelago, this species has been collected on the islands of Española, Floreana, Isabela, Marchena, Pinzon, San Cristobal, Santa Cruz, and Santiago. If this species is the same as *M. crotalaria* (Busck), then it also occurs on Trinidad, St. Thomas, and St. Croix in the Caribbean (Forbes, 1930).

**REMARKS:** A comparison of a male syntype of *M. adustipennis* with Galapagos specimens showed a perfect match in male genitalia and labial palpus. A lectotype will be designated by K. Sattler in a forthcoming revision of the genus (pers. comm. to BL).

### *Untomia* Busck 1906

Becker (1984) and Lee *et al.* (2009) respectively record seven species of *Untomia* for the Neotropical fauna and five species for the Nearctic fauna, none of

which were listed for both regions. Beccaloni *et al.* (2003) list a total of eight valid species of *Untomia*, all found in the Western Hemisphere. Not all species listed from the Neotropics by Becker (1984) belong in *Untomia* (K. Sattler, pers. comm. to BL), and *U. juventella* (Walsingham, 1897) was transferred to *Helcystogramma* by Hodges (1986). The European species of *Syncopacma* have similar wing pattern and genitalia (Elsner *et al.*, 1999) to those of the Galapagos species of *Untomia*, and *Syncopacma* Meyrick, 1925, described for a South African species, may be a synonym of *Untomia* (K. Sattler, pers. comm. to BL). All species of *Untomia* and *Syncopacma* of the Western Hemisphere and Europe and all Neotropical species of *Anacamptis* as well as those occurring in the south of the USA were checked to conclude that the Galapagos species was new. There are no host records available for *Untomia*, but Robinson *et al.* (2007) give several hosts for *Syncopacma* species, all in Fabaceae, except for one in Asteraceae.

*Untomia lunatella* Landry, sp. n.

Figs 35, 36, 75, 98

HOLOTYPE: ♂, 'ECU., GALAPAGOS | Isabela, nr Tagus Cove | 100 m. elev[ation].. 21.v.1992 | M[ercury]V[apour]L[amp], leg[it]. B. Landry'. 'HOLOTYPE | *Untomia* | *lunatella* | B. Landry'. Specimen in excellent condition. Deposited in the MHNG.

PARATYPES: 11 ♂, 22 ♀ from the Galapagos Islands, Ecuador. – *Floreana*: 1 ♂ (dissected, slide MHNG ENTO 6031), Las Cuevas, 23.iv.1992, M[ercury]V[apour]L[amp] (B. Landry). – *Isabela, Alcedo*: 1 ♂, 1 ♀ (dissected, slide MHNG ENTO 6033), lado NE, low arid zone, bosq[ue], palo santo, 18.iv.2002, u[ltra]v[iolet]l[ight] (B. Landry, L. Roque); 1 ♀, NE slope, near pega-pega camp, GPS: elev. 483 m, S 00° 24.029', W 91° 02.895', 31.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♀, Guayabillos, 700 m [elevation], 16.iv.2002, l[ampe]u[ltra]v[iolette] (B. Landry, L. Roque). – *Isabela, Darwin*: 1 ♀, Tagus Cove, 13.v.1992, MVL (B. Landry). – *Isabela, Sierra Negra*: 1 ♂, 1 ♀ Puerto Villamil, 2.iii.1989, MVL (B. Landry). – *Marchena*: 1 ♂, [no specific locality], 12.iii.1992, MVL (B. Landry). – *Pinta*: 1 ♂, 1 ♀ (dissected, slide MHNG ENTO 6032), Playa Ibbeston [sic], 13.iii.1992, MVL (B. Landry); 1 ♂ (dissected, MHNG ENTO 5368), same data except 14.iii.1992; 3 ♂, 3 ♀, Cabo Ibbeston, 8 m elev[ation].. N 00° 32.819', W 90° 44.229', 15.iii.2006, uvl (P. Schmitz, L. Roque); 1 ♀, arid zone, 15.iii.1992, MVL (B. Landry); 1 ♀ (dissected, slide MHNG ENTO 5369), ±50 m elev., 20.iii.1992, MVL (B. Landry). – *Pinzon*: 1 ♀, plaja Escondida, 20.iv.2002, uvl (B. Landry, L. Roque). – *San Cristobal*: 5 ♀ (one dissected, slide BL 1671), P[uer]to Baquarizo [sic], 17.ii.1989, MVL (B. Landry). – *Santa Cruz*: 1 ♀, C[harles]D[arwin]R[esearch]S[tation], wall of Invert[ebate]s. Lab., GPS: 11 m elev., S 00° 44.478', W 90° 18.132', 19.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♀, CDRS, Barranco, 20 m elev., 30.iv.2002, uvl (B. Landry); 1 ♂ (dissected, slide MHNG ENTO 6034), 1 ♀, E[stacion]C[ientifica]C[harles]D[arwin], 22 m elev., S 00° 44.291', W 90° 18.107', 23.iii.2006, uvl (P. Schmitz); 1 ♀, transition zone, recently cut road, GPS: S 00° 42.528', W 90° 18.849', 12.iii.2004, uvl (B. Landry, P. Schmitz). – *Santa Fe*: 1 ♂, Tourist trail, 28.v.1992, MVL (B. Landry). – *Santiago*: 1 ♀ (dissected, slide MHNG ENTO 6035), Bahía Espumilla, 4.iv.1992, MVL (B. Landry). Deposited in the BMNH, CDRS, CNC, and MHNG.

ETYMOLOGY: The name is derived from the shape of the white, postmedian forewing markings, which resemble a pair of crescents usually touching each other along the wing's midline.

DIAGNOSIS: The dark brown forewing pattern with a postmedian pair of white crescents usually joined medially is unique among Galapagos Gelechiidae and other microlepidoptera.

Several species, notably *Syncopacma* species from Europe, have a dark brown forewing with a complete or incomplete postmedian line, but in all European species

this line is straight. Some North American species with this pattern are placed in genus *Anacamptis*. The most similar are *A. agrimoniella* (Clemens, 1860), described from Pennsylvania, USA, and *A. lupinella* Busck, 1901 (some specimens only), described from Ontario, Canada, but in both of these species the postmedian line is straight, although it can be incomplete in the latter.

**DESCRIPTION:** *Male* (n=12) (Fig. 35). Head with ocelli, greyish brown with copper lustre, mostly with large scales converging toward middle, also with tiny white scales along eye margin. Haustellum greyish brown. Maxillary palpus dark brown and white. Labial palpus with basal segment greyish brown; segment II mostly dark brown laterally and white medially with dark brown toward apex; segment III longitudinally striped dark brown and white. Antennal scape without pecten, striped dark brown and white; pedicel coloured as scape; flagellum dark brown with white stripe on basal half. Thorax mostly coloured as head, metathorax paler greyish brown. Foreleg coxa and femur greyish brown; tibia dark brown; tarsus dark brown with white apical ring on tarsomeres I–IV. Midleg as in foreleg, except tibia with some white scales at apex. Hindleg as preceding legs, except tibia with white patches at bases of spurs and with greyish-brown tuft on dorsal edge. Forewing length: 3.3–4.0 mm (Holotype: 4.0 mm). Forewing with basal third greyish brown, distal 2/3 dark brown, with small black and white spot in fold at 1/3, with pair of crescent-shaped ivory-white markings usually joined medially from costa and dorsum at 2/3; fringe with first row of scales shining snow white on basal 2/3 and dark brown at tip, second row longer, greyish brown. Hindwing brown with concolorous fringe. Abdomen brown dorsally and iridescent, greyish brown ventrally; segment VIII unmodified.

Male genitalia (n=4) (Fig. 75). Uncus about half as long as tegumen, tube like (of equal width for whole length), bent almost at right angle from middle, with 4 short, strongly sclerotized pegs pointing down at apex, abundantly setose. Gnathos strongly sclerotized, bent at right angle from middle, with shortly upturned apex. Tegumen narrow, with dorsal margin straight, ventral margins slightly produced ventrally, widely rounded, with pair of short setae near margin on ventral flanges, and lateral margins slightly expanding from base to apex, with apex almost twice as wide as base. Valva narrow, of same girth for whole length, slightly upturned from middle, moderately sclerotized and setose, membrane between bases of valvae adorned with few short to long setae. Vinculum laterally reduced, narrow, laterally compressed and crescent shaped with posterior edge adorned with moderately long setae; ventrally quadrangular, slightly longer than wide, with straight apical and lateral margins, with anterior margin slightly concave, apically with digit-like projections slightly shorter than ventral base, slightly curving medially, with few tiny setae laterally near apex, with short, laterally compressed apex. Phallus disposed tightly against ventral part of vinculum, leaving wide gap between it and bases of valvae, straight, without coecum penis, gently diminishing in girth toward apex, distal half asymmetrical, with right side membranous, narrowly rounded at apex.

*Female* (n=22) (Fig. 36): Antenna, wing pattern, and colour as in male. Frenulum with 2 acanthae. Forewing length: 2.9–4.0 mm. Segment VII unmodified except for concave apical margins.

Female genitalia (n=4) (Fig. 98). Papillae anales short, almost evenly broadly rounded, moderately setose, with short, thin sclerotized band at base ventrally and dorsally from bases of posterior apophyses. Latter thin, straight, reaching basal margin of segment VIII. Anterior apophyses shorter, slightly curved, as thin and half as long as posterior ones. Segment VIII slightly longer than papillae, sclerotized for whole length laterally except circular gap dorsally from base of anterior apophyses, with apical margins broadly rounded; dorsally with sclerotized area narrower, with shallow median circular depression with rugged surface; ventrally membranous medially, with lateral sclerotized areas forming dorsal and ventral triangular projections almost touching ventrally near middle. Ostium bursae at base of segment VIII medially, without associated sclerotization. Ductus bursae short and mostly membranous and spiculate, with narrow posterior end slightly funnel shaped and lightly sclerotized, with anterior 1/4 slightly enlarging toward corpus bursae. Latter slightly elongate, prune shaped, with posterior half spiculate, without signum, with inception of ductus seminalis posteriorly set, close to connection with ductus bursae, with most of posterior half spiculate.

**BIOLOGY:** Unknown except that specimens were attracted to light mostly near sea level, but also at higher elevations, up to 700 meters, from February until May.

**DISTRIBUTION:** Apparently endemic to the Galapagos, this species is widespread, with records from Floreana, Isabela, Marchena, Pinta, Pinzon, San Cristobal, Santa Cruz, Santa Fe, and Santiago.

**REMARKS:** This is the only Galapagos species of Gelechiidae for which the frenulum of the female has two acanthae, the others having three.

## Pexicopiinae

### *Sitotroga* Heinemann, 1870

A small genus of three species. Its most commonly encountered species, a pest of stored grains distributed around the planet, is treated below. It has been recorded numerous times in checklists and taxonomic treatments of Gelechiidae on all continents.

#### *Sitotroga cerealella* (Olivier, 1789)

Figs 37, 76, 77, 99

*Alucita cerealella* Olivier, 1789: 121, pl. 93 fig. 8.

*Sitotroga cerealella* (Olivier). – Meyrick, 1925: 38. – Forbes, 1930: 115, 116. – Zimmerman, 1978: 1738–1741, figs 1294–1297. – Becker, 1984: 49. – Lee *et al.*, 2009: 32.

**MATERIAL EXAMINED:** Several specimens in the BMNH and MHNG. 9 specimens (sexes not noted) collected on one Galapagos Island. – Santa Cruz: Puerto Ayora, en arroz grano. (CDRS).

**DIAGNOSIS:** This species can be separated from the other two members of the genus as follows: *S. horogramma* (Meyrick, 1921) described from Fiji, has the forewing with a dark brown line along the costa, interrupted subapically, another along the terminal margin, and a small spot sometimes at 2/3 medially. *Sitotroga psacasta* (Meyrick, 1908), described from the Transvaal, South Africa, has brown markings on the forewing as a spot or long dash submedially on the fold, a costal spot at 2/3, and a line subterminally, parallel to termen.

In the Galapagos this species is most similar to *Mesophleps adustipennis* (Walsingham) and *Dichomeris acuminatus* (Staudinger) from which it can be separated by the presence of a pecten on the antennal scape and other features (see diagnosis of *D. acuminatus* below). This is the only Galapagos species of Gelechiidae adorned with a scape pecten.

**BIOLOGY:** The larva and pupa have been illustrated by Zimmerman (1978), who also reported on the larval behaviour. The species is a long recognized pest of grains either in the field or in storage. The larva has been reported to feed on barley, corn, rice, wheat, and other Poaceae, but also on beans and peas (Fabaceae) (Zimmerman, 1978).

In the Galapagos specimens were reared on rice grains.

**DISTRIBUTION:** *Sitotroga cerealella* is widely distributed in temperate to tropical regions around the world, probably everywhere humans have been growing and storing grains and have been in commercial contact with Europeans. In the Galapagos it has been found so far only on the island of Santa Cruz.

**REMARKS:** The specimen illustrated here was collected in Switzerland. Known as the Angoumois grain moth, this species has six known synonyms (see Beccaloni *et al.*, 2003). The references cited above do not represent an exhaustive list, but are those used elsewhere here.

## Dichomeridinae

### *Dichomeris* Hübner, 1818

A large genus with several hundred species and 79 known generic synonyms (see Hodges, 1986). It is rich in species in all areas around the World except Australia, and there are no native species in the Pacific Islands and New Zealand. The caterpillars are leaf tiers and feed on a variety of plant families.

#### *Dichomeris acuminatus* (Staudinger, 1876)

Figs 38, 78, 79, 100

*Mesophleps* ? *acuminatus* Staudinger, 1876: 148.

*Dichomeris acuminatus* [or *acuminata*] (Staudinger). – Zimmerman, 1978: 1706–1713, figs 1262–1267. – Becker, 1984: 50. – Hodges, 1986: 38–40, pl. 4 fig. 1, text fig. 9.

**MATERIAL EXAMINED:** Several specimens in the BMNH. 13 ♂ (1 dissected), 10 ♀ (1 dissected) collected on the Galapagos Islands. – *Española*: Bahía Manzanillo. – *Isabela*, Alcedo: NE slope Alcedo, near shore, 9 m elev., S 00° 23.619', W 90° 59.715'; NE slope Alcedo, 292 m elev., S 00° 23.829', W 91° 01.957'. – *Isabela*, Darwin: Tagus Cove; 630 m elev. – *Marchena*: [no specific locality]. – *Pinta*: Playa Ibbeston [sic]; arid zone; ±50 m elev.; 400 m elev. – *Rabida*: Tourist trail. – *Santa Cruz*: Estacion Científica Charles Darwin. – *Santiago*: La Bomba, 6 m elev., S 00° 11.151', W 90° 42.052'. Deposited in the BMNH, CDRS, CNC, and MHNG.

**DIAGNOSIS:** This species belongs to the '*acuminata* group' of *Dichomeris* (Hodges, 1986) composed of one additional taxon, i.e. *D. nenia* Hodges distributed in the Southeast of the USA. These can be separated by the pale orange scales above the eye in *D. acuminatus*, medium to dark grey in *D. nenia*, the smooth median margins of the lobes of the juxta in *D. acuminatus* (Fig. 78), serrate in *D. nenia*, and in the female genitalia, by the antrum with the ventral plate shorter than broad in *D. acuminatus* (Fig. 100), longer than broad in *D. nenia*.

In the Galapagos this species is most similar to *Mesophleps adustipennis* (Walsingham) and *Sitotroga cerealella* (Olivier). The three can be separated by the



presence of dark brown scaling on the distal half of the forewing costa in *M. adustipennis*, and the presence of a pecten on the antennal scape in *S. cerealella*. In addition, *D. acuminatus* has a large, anteriorly produced ventral scale tuft on the second labial palp segment whereas there is a scale tuft only dorsally in *M. adustipennis* and none in *S. cerealella*. The Galapagos specimens available vary in forewing length from 4.7 to 5.3 mm in males, and 3.8 to 5.1 mm in females. The forewing submedian and post-median spots along midline are rarely expressed more strongly than in the specimen illustrated here.

**BIOLOGY:** The larva has been recorded to feed on many different species of Fabaceae such as *Cajanus cajan* (L.) Huth (pigeon pea), *Cyamopsis* species, *Desmodium gyroides* de Candolle (indigo), *Medicago sativa* L. (alfalfa), *Sesbania sericea* (Willdenow) de Candolle, and *Tephrosia* species (Hodges, 1986). The species has been known to reach pest status on alfalfa and indigo. Robinson *et al.* (2007) also list species of *Aeschynomene*, *Glycine*, *Indigofera*, *Lotus*, *Pisum*, and *Trifolium*. The larva and pupa have been illustrated by Zimmerman (1978). In the Galapagos the specimens were collected at light from the sea shore to 630 m in elevation in the months of March, April, and May.

**DISTRIBUTION:** Widely distributed in tropical and subtropical regions around the world, *D. acuminatus* has been collected on the islands of Española, Isabela, Marchena, Pinta, Rabida, Santa Cruz, and Santiago of the Galapagos archipelago.

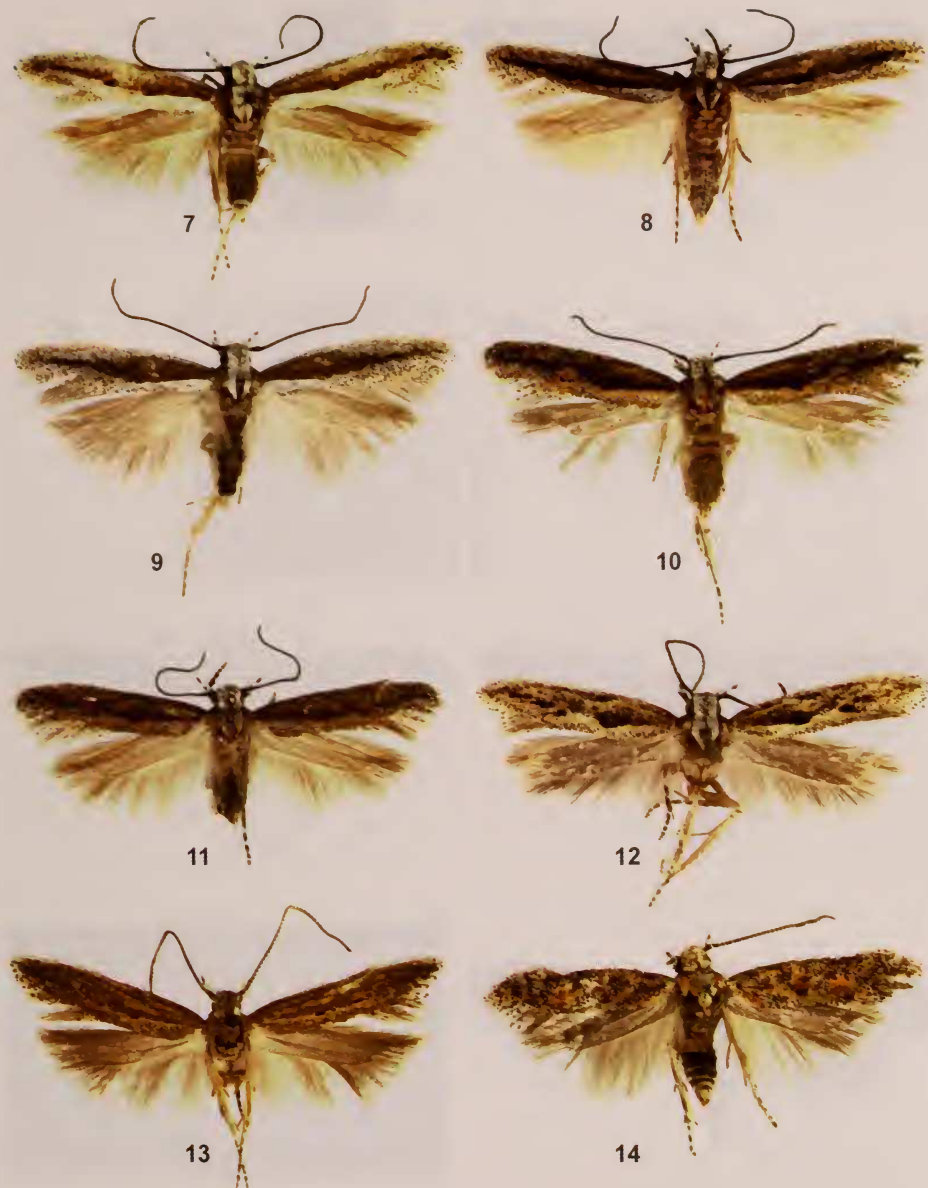
**REMARKS:** This species was first described from Sicily, Italy. Five synonyms, based on specimens described from Réunion, St. Vincent, France, Australia, and Sri Lanka are known (see Hodges, 1986: 38).

The male dissected from the Galapagos was collected at Tagus Cove, near the sea shore, on the west side of Isabela at the base of Volcan Darwin. Its phallus has a rather long cornutus, such as that illustrated by Zimmerman (1978), which contrasts with the shorter one illustrated by Hodges (1986). Specimens from Gambia, Japan, and Morocco in the BMNH also show a long cornutus.



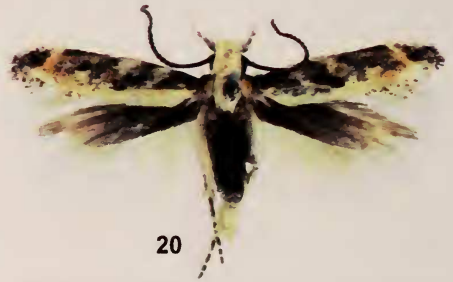
FIGS 1–6

Adults of Galapagos Gelechiini. (1) *Aristotelia naxia*: ♀, Isabela, 11.iii.1989, CNC. (2–3) *Aristotelia sarcodes*: (2) ♂, San Cristobal, 16.ii.2004, MHNG. (3) ♂, under side of wings with hair pencil extended. (4) *Chionodes stefaniae*: ♂ holotype, MHNG. (5) *Stegasta zygotoma*: ♂, Santa Cruz, 7.iii.1992, MHNG. (6) *Stegasta francisci*: ♀ paratype, Isabela, 20.v.1992, MHNG.



FIGS 7–14

Adults of Galapagos Gnorimoschemini. (7–12) *Ephysteris sporoboella*. (7) ♂ holotype, MHNG. (8) ♀ paratype, Santa Fe, 28.v.1992, MHNG. (9) ♂ paratype, Isabela, 30.iii.2004, MHNG. (10) ♀ paratype, San Cristobal, 15.iii.2004, MHNG. (11) ♀ paratype, Isabela, 16.v.1992, MHNG. (12) ♂ paratype, Wolf, 7.ii.2002, CDRS. (13) *Ephysteris scimitarella*: ♂ holotype. (14) *Ephysteris subdiminutella*: ♂, Santiago, 1.iii.2005, MHNG.



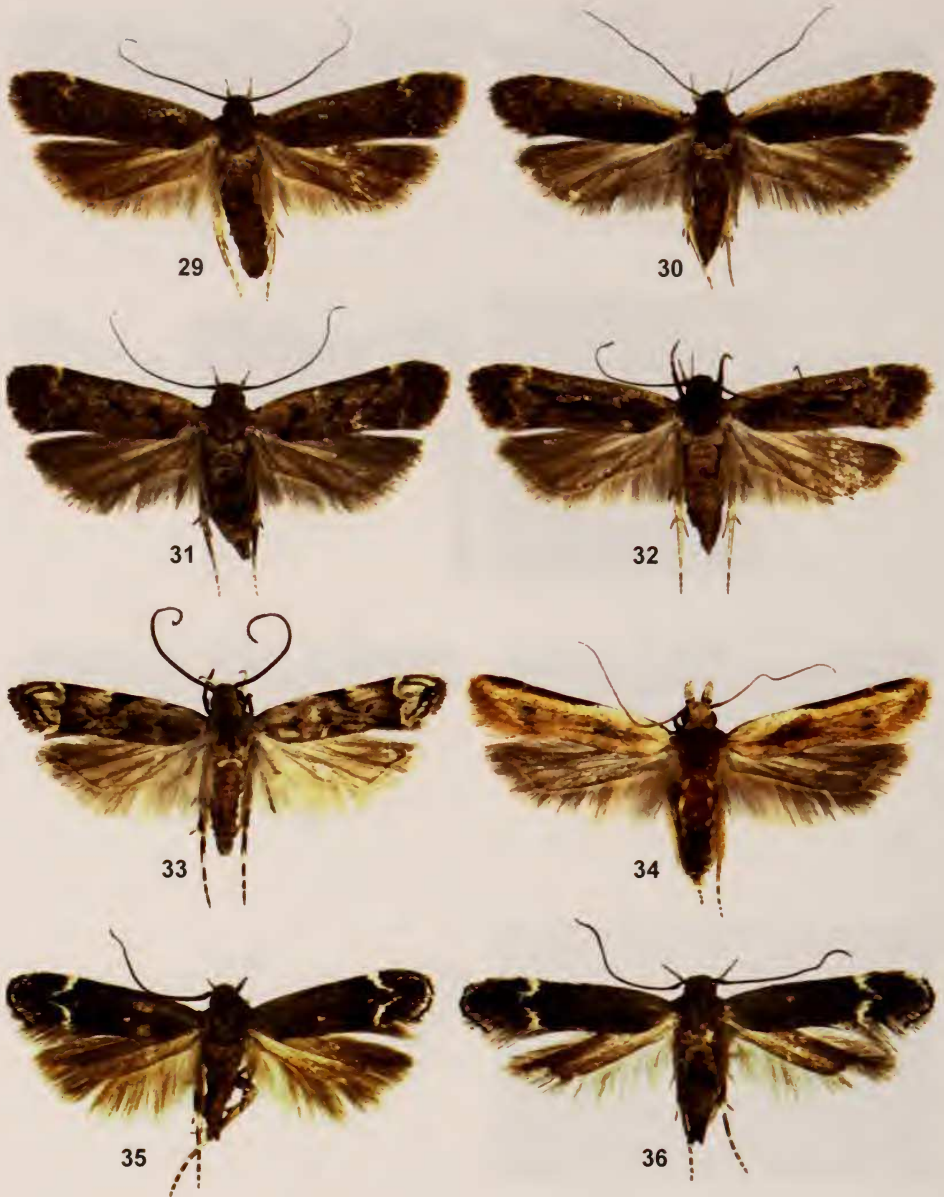
FIGS 15–22

Adults of Galapagos Gnorimoschemini. (15–16) *Phthorimaea perfidiosa*. (15) ♂, Genovesa, 25.iii.1992, MHNG. (16) Apex of ♂ abdomen. (17) *Phthorimaea absoluta*: ♂, San Cristobal, 27.xi.2001, CDRS. (18) *Scrobipalpula densata*: ♂, Sombrero Chino, 6.vii.1998, CDRS. (19) *Scrobipalpula inornata*: ♂ paratype, Santa Cruz, 13.iii.2004, MHNG. (20–21) *Scrobipalpula equatoriella*. (20) ♂ holotype. (21) ♀ paratype, Santa Cruz, 19.iii.2004, MHNG. (22) *Scrobipalpula caustona*: ♂ holotype.



FIGS 23–28

Adults of Galapagos Gnorimoschemini and Litini. (23–26) *Symmetrischema escondidella*. (23) ♂ paratype, Pinzon, 27.iii.2006, MHNG. (24) ♀ paratype, Plaza Sur, 14.iv.2006, MHNG. (25) Head. (26) Underside of ♂ wings. (27–28) *Agnippe omphalopa*: (27) ♂, Isabela, 3.iii.1989, CNC; (28) ♀, Pinzon, 20.iv.2002, MHNG.



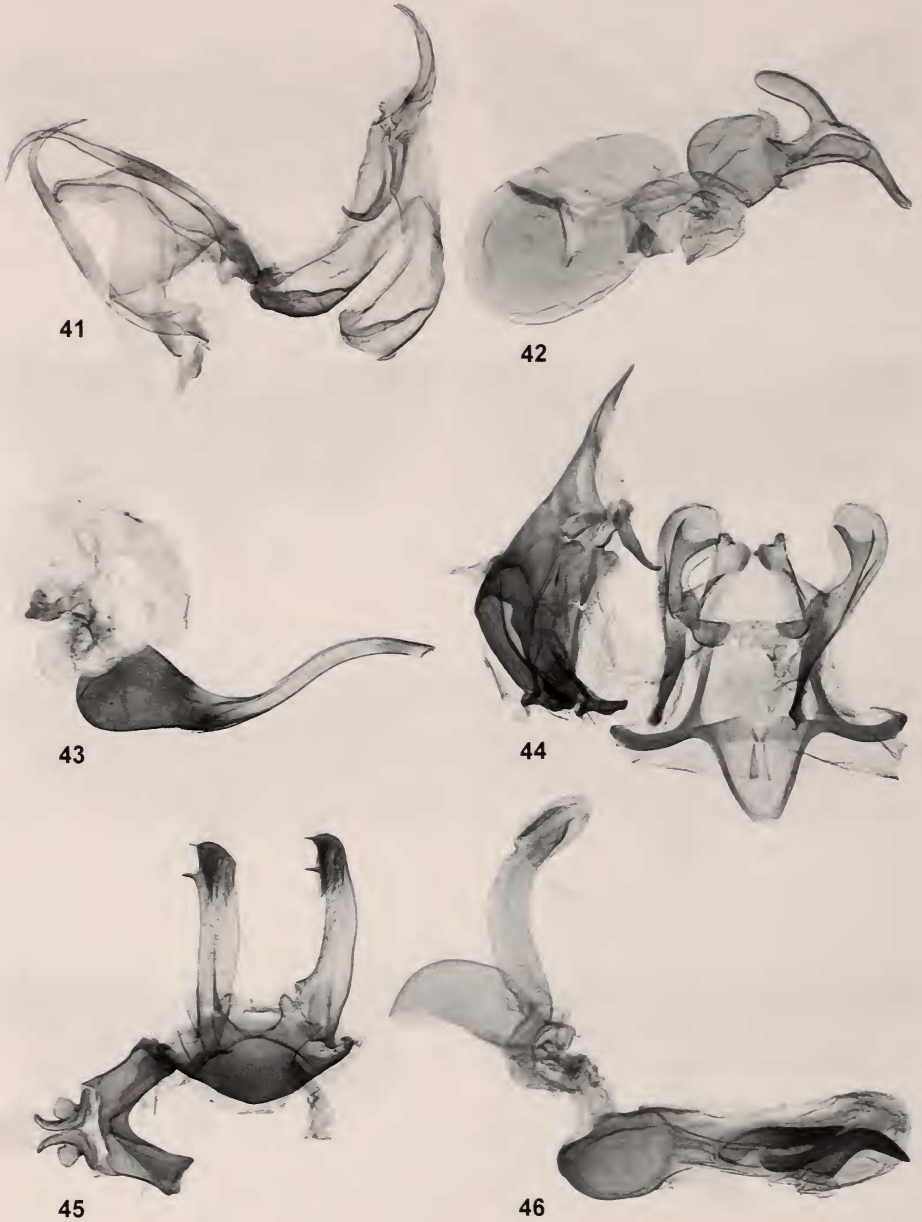
FIGS 29–36

Adults of Galapagos Anacampsini. (29–32) *Anacampsis primigenia*. (29) ♂, Pinzon, 20.iv.2002, MHNG; (30) ♀, Pinzon, 20.iv.2002, MHNG. (31) ♂, San Cristobal, 16.iii.2004, MHNG. (32) ♀, Pinta, 17.iii.1992, MHNG. (33) *Compsolechia salebrosa*: ♂, Isabela, 9.iii.1989, CNC. (34) *Mesophleps adustipennis*: ♂, San Cristobal, 15.iii.2004, MHNG. (35–36) *Untomia lunatella*: (35) ♂ holotype; (36) ♀ paratype, Santa Cruz, 19.iii.2004, MHNG.



FIGS 37–40

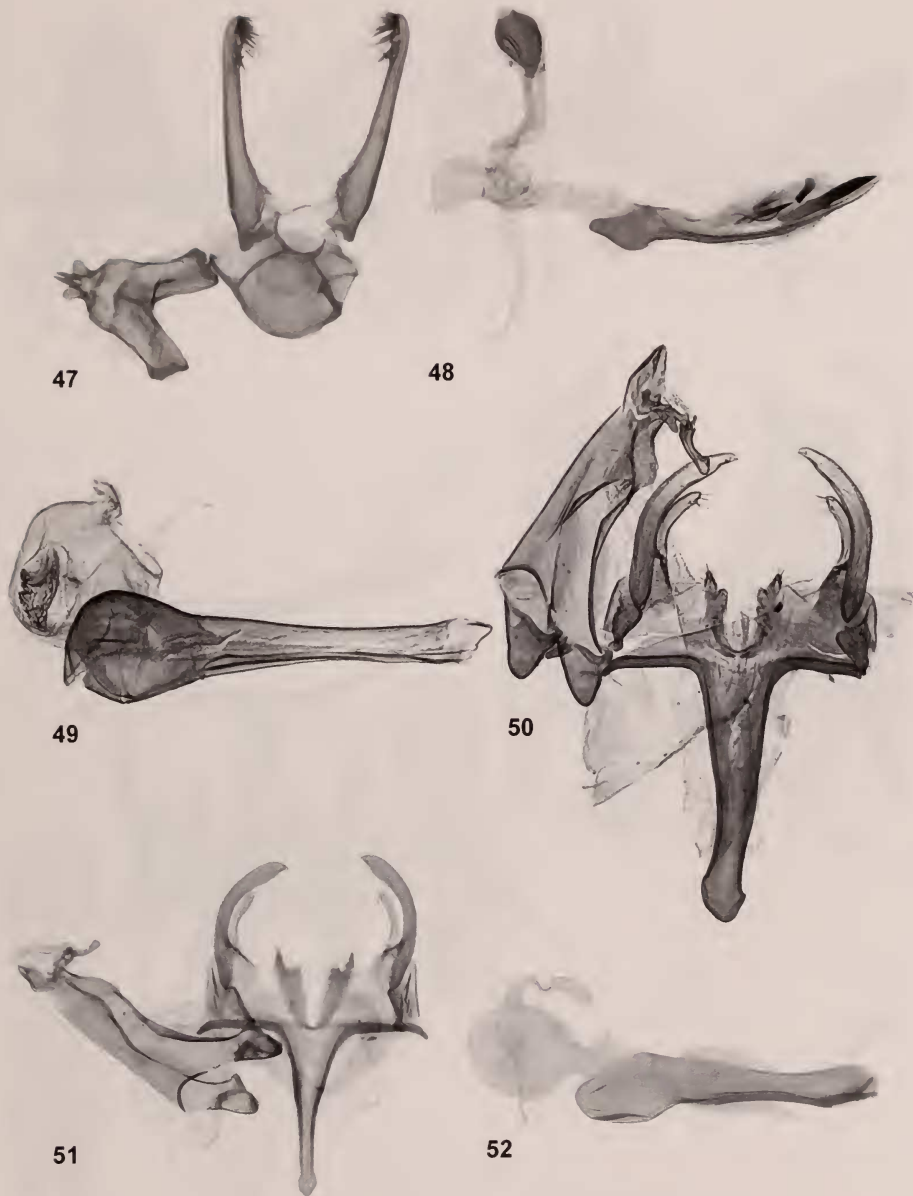
Adults of Galapagos Pexicopiinae, Dichomeridinae, and undetermined Gnorimoschemini. (37) *Sitotroga cerealella*: ♂, Switzerland, Tessin, Locarno, MHNG. (38) *Dichomeris acuminatus*: ♂, Pinta, 13.iii.1992, MHNG. (39–40) Gnorimoschemini spp.: (39) ♀, Española, 2.v.1992, MHNG, forewing length = 3.7 mm; (40) ♀, Santa Cruz, 18.ii.2005, MHNG, forewing length = 3.3 mm.



FIGS 41-46

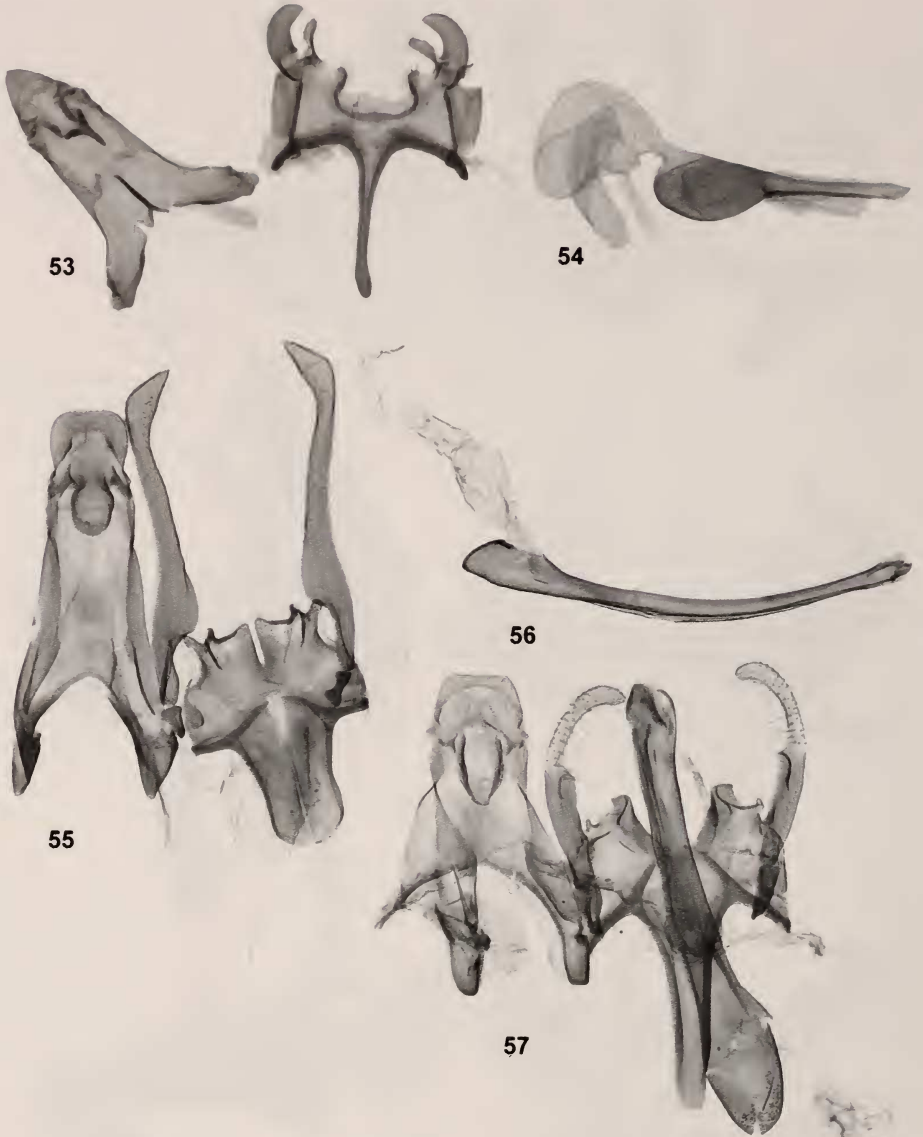
Male genitalia of Galapagos Gelechiinae. (41-42) *Aristotelia naxia*, slide MHNG ENTO 5354. (41) Genitalia without phallus. (42) Phallus. (43-44) *A. sarcodes*, slide MHNG ENTO 4904: (43) Phallus. (44) Genitalia without phallus. (45-46) *Stegasta zygotoma*, slide MHNG ENTO 5358. (45) Genitalia without phallus. (46) Phallus.





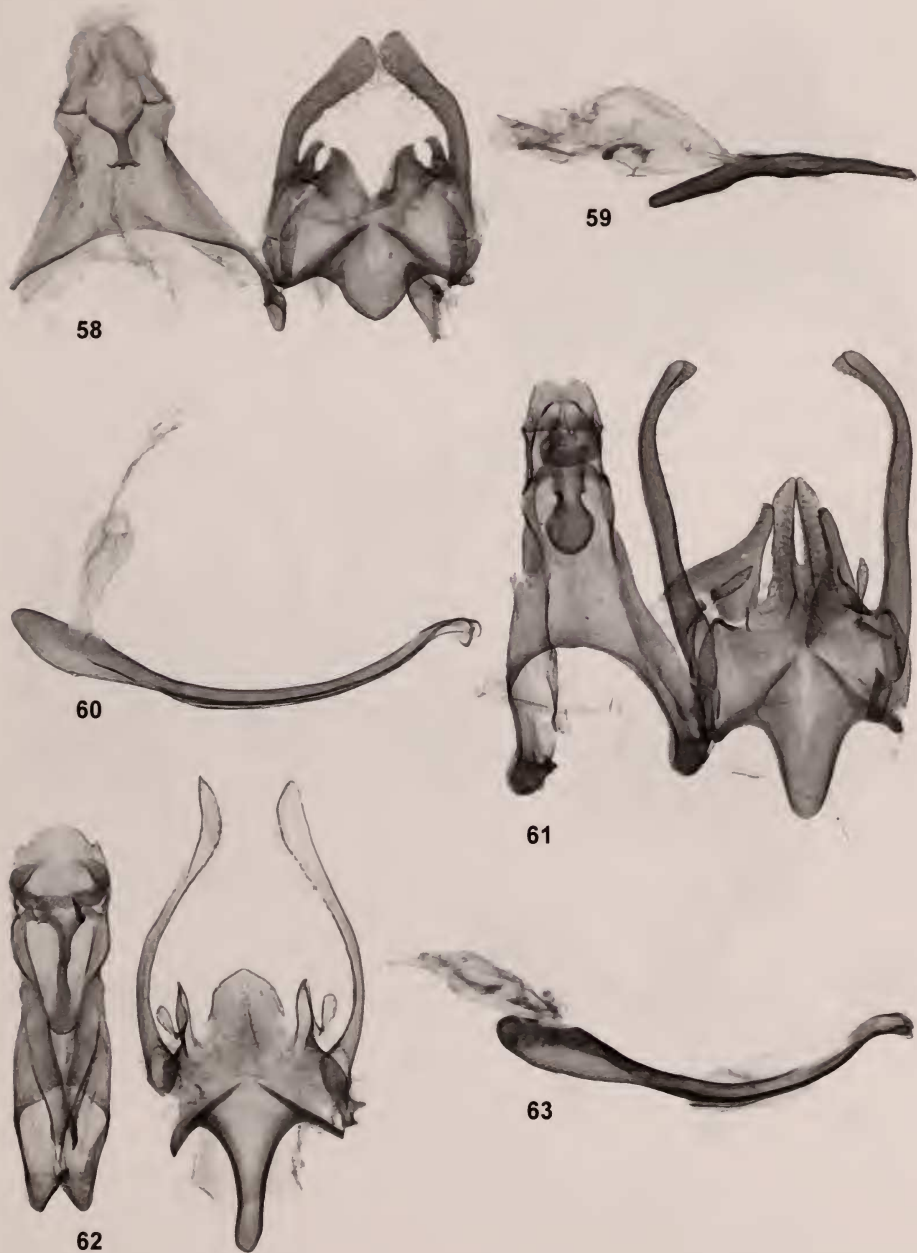
FIGS 47-52

Male genitalia of Galapagos Gelechiinae. (47-48) *Stegasta francisci*, slide MHNG ENTO 5953: (47) Genitalia without phallus. (48) Phallus. (49-50) *Ephysteris sporobolella*, slide MHNG ENTO 4925. (49) Phallus. (50) Genitalia without phallus. (51-52) *E. scimitarella*, holotype. (51) Genitalia without phallus; (52) Phallus.



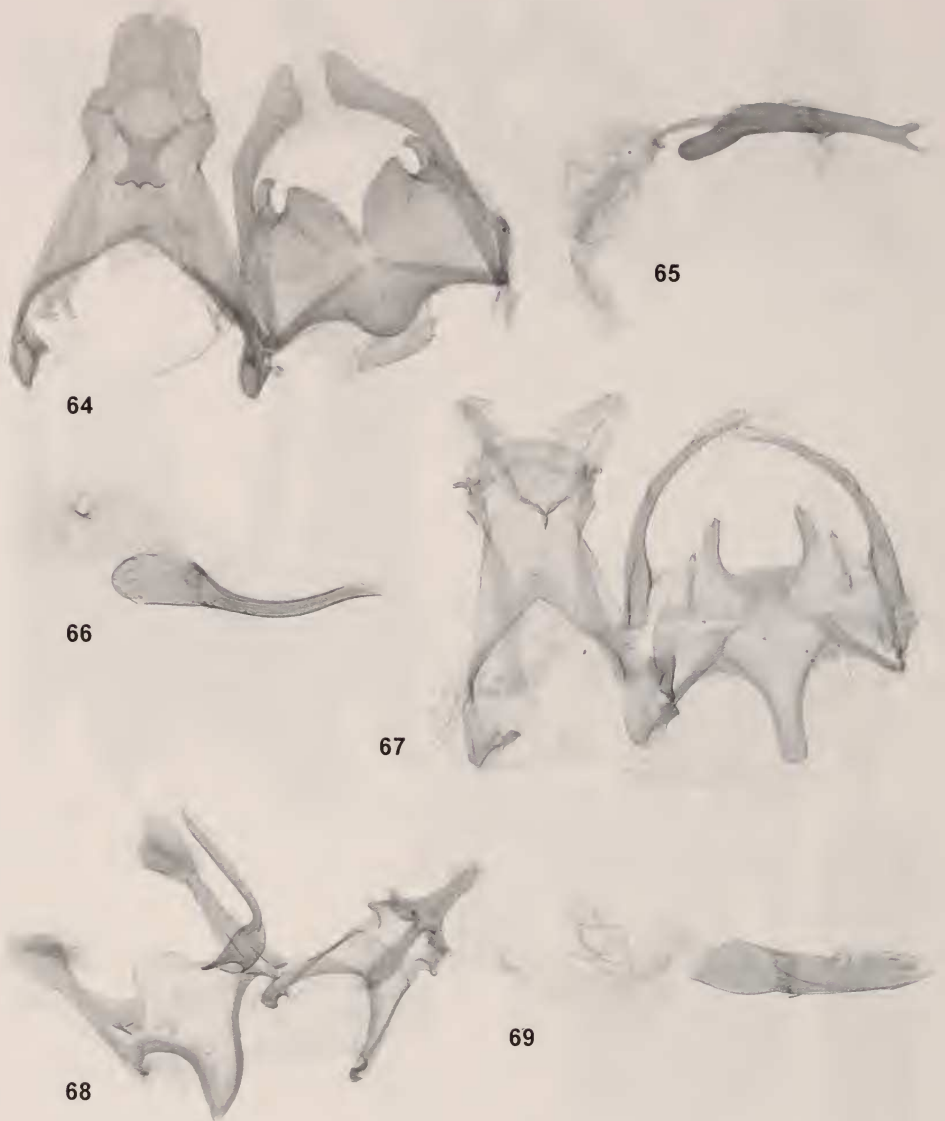
FIGS 53–57

Male genitalia of Galapagos Gelechiinae. (53–54) *Ephysteris subdiminutella*, slide MHNG ENTO 4929. (53) Genitalia without phallus. (54) Phallus. (55–56) *Phthorimaea perfidiosa*, slide MHNG ENTO 5947. (55) Genitalia without phallus. (56) Phallus. (57) *Phthorimaea absoluta*, slide BL 1424 (CDRS), whole genitalia.



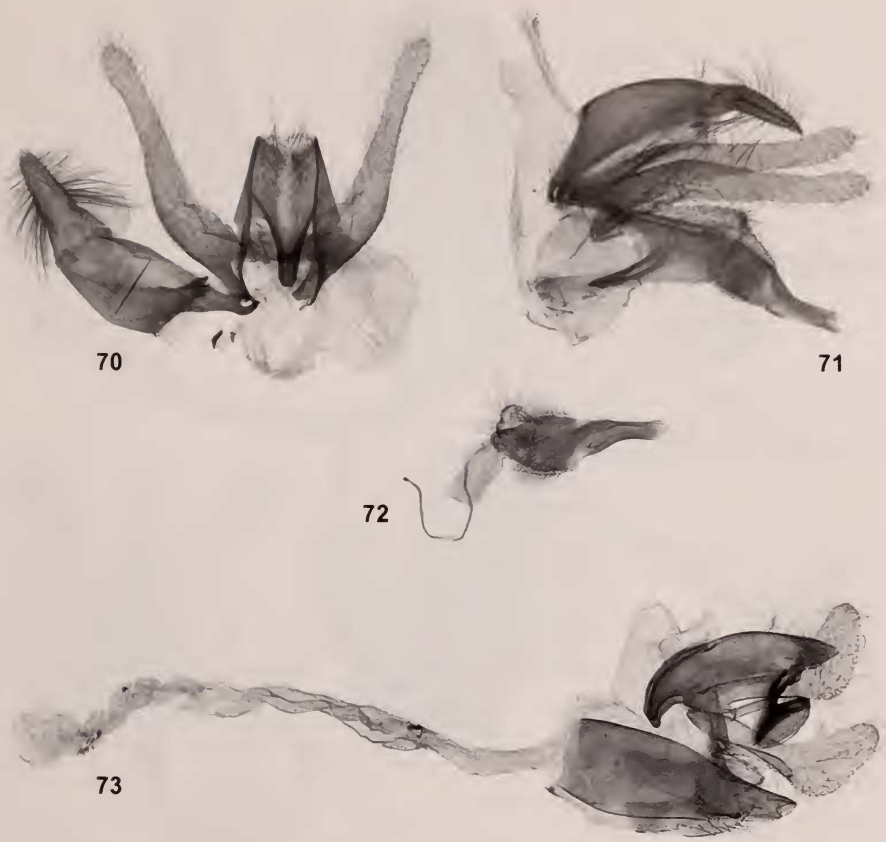
FIGS 58-63

Male genitalia of Galapagos Gelechiinae. (58-59) *Scrobipalpula densata*, slide BL 1668 (CDRS). (58) Genitalia without phallus. (59) Phallus. (60-61) *Scrobipalpula inornata*, slide MHNG ENTO 5359. (60) Phallus. (61) Genitalia without phallus. (62-63) *S. equatoriella*. (62) Genitalia without phallus, slide BMNH Microlep. 29741. (63) Phallus, slide MHNG ENTO 5960.



FIGS 64-69

Male genitalia of Galapagos Gelechiinae. (64-65) *Scrobipalpula caustonae*, slide MHNG ENTO 5360. (64) Genitalia without phallus. (65) Phallus. (66-67) *Symmetrischema escondidella*, slide MHNG ENTO 5976. (66) Phallus. (67) Genitalia without phallus. (68-69) *Agnippe omphalopa*, slide MHNG ENTO 5371. (68) Genitalia without phallus. (69) Phallus.



FIGS 70-73

Male genitalia of Galapagos Gelechiinae. (70-72) *Anacamptis primigenia*. (70, 72) Genitalia without phallus (70) and phallus (72), slide MHNG ENTO 5365. (71) Genitalia in side view, slide MHNG ENTO 6026. (73) *Compsolechia salebrosa*, slide MHNG ENTO 6030, whole genitalia in side view.



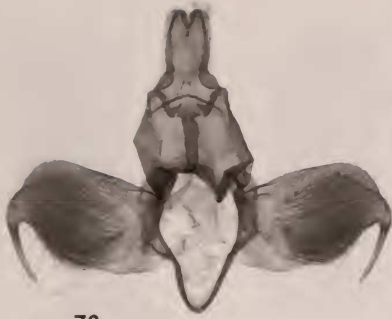
74



75

FIGS 74-75

Male genitalia of Galapagos Gelechiinae. (74) *Mesophleps adustipennis*, slide MHNG ENTO 6016, whole genitalia, spread in apical view. (75) *Untomia lunatella*, slide MHNG ENTO 6033, whole genitalia in side view.



76



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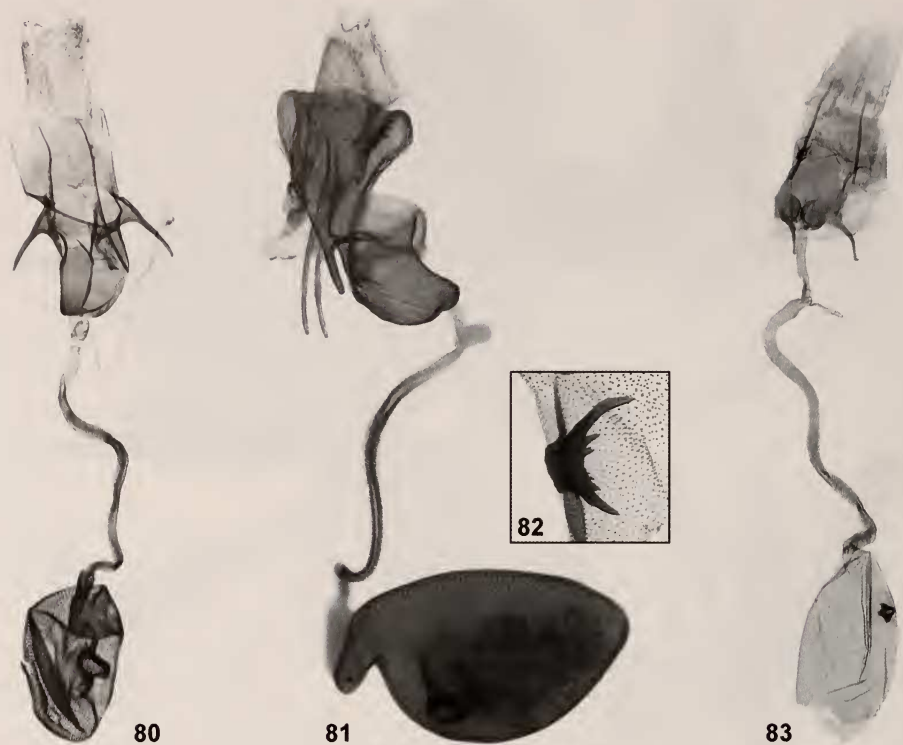
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## FIGS 76-79

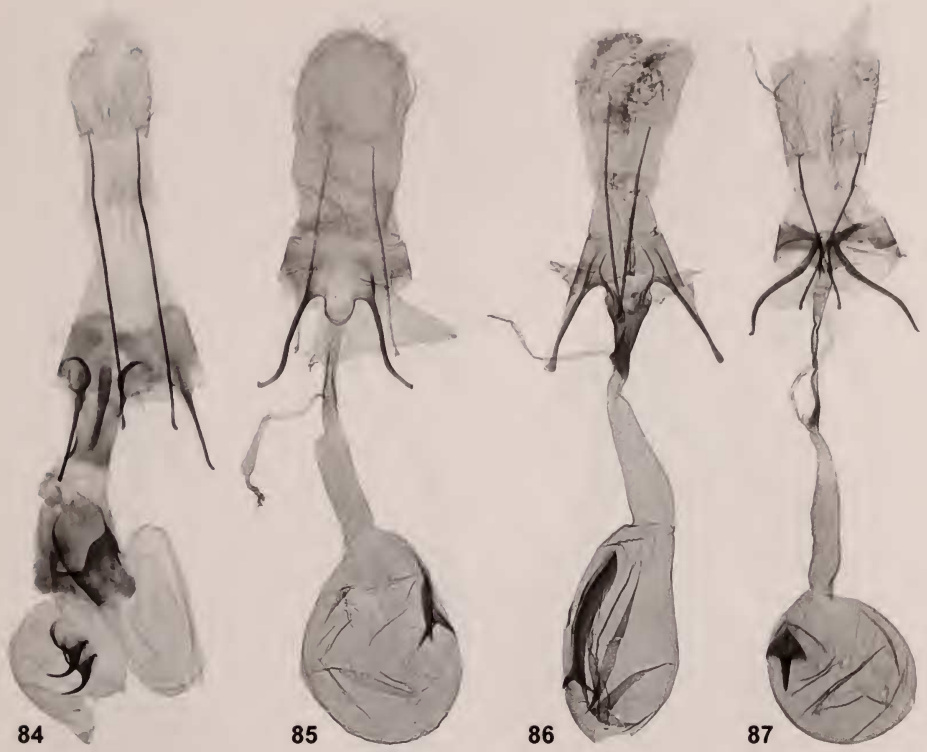
Male genitalia of Galapagos Pexicopiinae and Dichomeridinae. (76-77) *Sitotroga cerealella*, slide MHNG ENTO 6020. (76) Genitalia without phallus. (77) Phallus. (78-79) *Dichomeris acuminatus*, slide MHNG ENTO 5361. (78) Genitalia without phallus. (79) Phallus.



FIGS 80-83

Female genitalia of Galapagos Gelechiinae. (80-82) *Aristotelia naxia*. (80) Slide MHNG ENTO 4955. (81) Specimen in lactic acid, unmounted. (82) Slide MHNG ENTO 4953. (83) *A. sarcodes*, slide MHNG ENTO 4905.





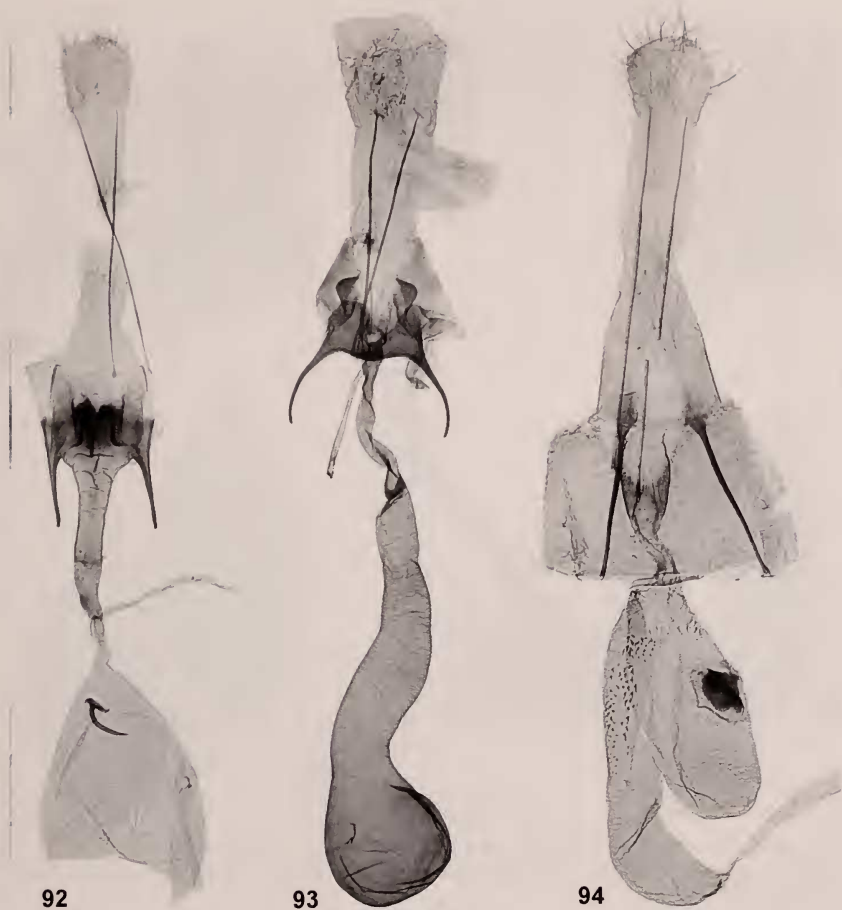
FIGS 84-87

Female genitalia of Galapagos Gelechiinae. (84) *Stegasta francisci*, slide MHNG ENTO 5954. (85) *Ephysteris sporobolella*, slide MHNG ENTO 4916. (86) *E. scimitarella*, slide BL 1669 (CNC). (87) *E. subdiminutella*, slide MHNG ENTO 5991.



FIGS 88-91

Female genitalia of Galapagos Gelechiinae. (88) *Phthorimaea perfidiosa*, slide MHNG ENTO 5946. (89) *Phthorimaea absoluta*, slide MHNG ENTO 4921. (90) *Scrobipalpula ?densata*, slide BL 1178 (CDRS). (91) *Scrobipalpula inornata*, slide MHNG ENTO 5957.



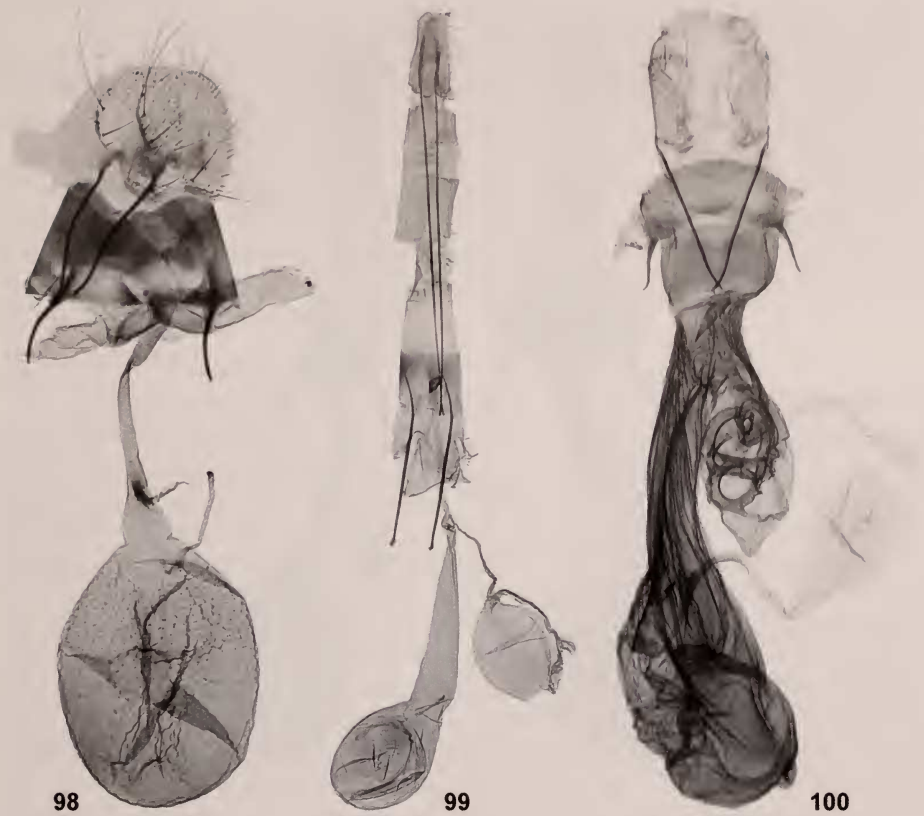
FIGS 92-94

Female genitalia of Galapagos Gelechiinae. (92) *Scrobipalpula equatoriella*, slide MHNG ENTO 5961. (93) *Symmetrischema escondidella*, slide MHNG ENTO 5975. (94) *Agnippe omphalopa*, slide MHNG ENTO 5372.



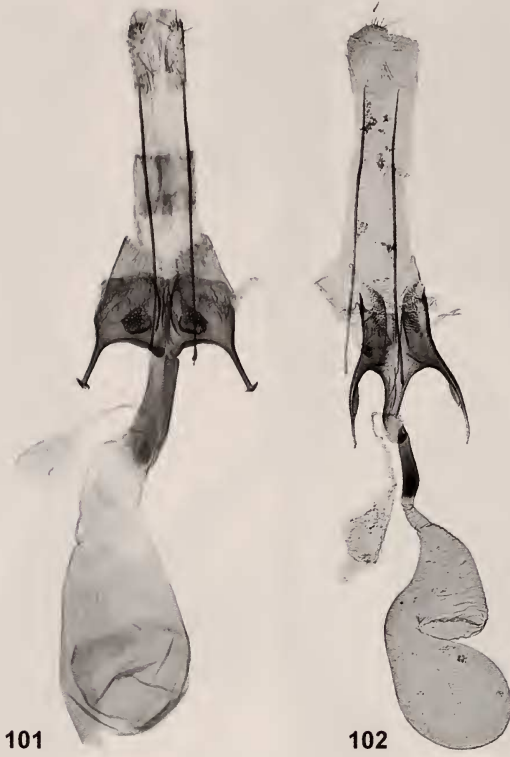
FIGS 95-97

Female genitalia of Galapagos Gelechiinae. (95) *Anacampsis primigenia*, slide MHNG ENTO 5364. (96) *Compsolechia salebrosa*, slide MHNG ENTO 6029. (97) *Mesophleps adustipennis*, slide MHNG ENTO 6018.



FIGS 98-100

Female genitalia of Galapagos Gelechiinae, Pexicopiinae, and Dichomeridinae. (98) *Untomia lunatella*, slide MHNG ENTO 6035. (99) *Sitotroga cerealella*, slide MHNG ENTO 6021. (100) *Dichomeris acuminatus*, slide MHNG ENTO 4931.



FIGS 101-102

Female genitalia of Galapagos unidentified Gelechiinae. (101) *Gnorimoschemini* sp. A, slide MHNG ENTO 4930. (102) *Gnorimoschemini* sp. B, slide MHNG ENTO 6014.

## CONCLUSIONS

In the present state of knowledge of the whole Galapagos Lepidoptera fauna, the Gelechiidae, with 22 species, plus an additional two species untreated taxonomically here, represent the third most diverse family following the Noctuidae and Pyralidae (sensu lato). Undoubtedly there are more species present, some of them almost certainly endemic. In addition, some widespread species like *Phthorimaea operculella* (Zeller, 1873), a major pest of potato, tobacco, and a variety of other plants, will probably make their way to the archipelago eventually, given the high rate of exchange of goods and people with the continent. All in all, there is still much to learn from this mega-diverse group of moths in the Galapagos, especially regarding the host plant associations of the species.

## ACKNOWLEDGEMENTS

We are grateful to Klaus Sattler (BMNH) for his help in the determination of the taxa and for sharing information from his manuscript revision of *Mesophleps*, and to David Adamski and Jean-François Landry for comparing USNM types with Galapagos specimens and for additional information. We are thankful to Kevin Tuck (BMNH) for allowing us to study specimens under his care, and John W. Brown (USNM) for sending type material. Ronald W. Hodges, Ole Karsholt, and Sangmi Lee provided useful information for which we are grateful. We also thank the authorities of the Galapagos National Park for issuing permits, the authorities and staff of the Charles Darwin Research Station for logistical support, and Stewart B. Peck (Carleton University, Ottawa) for inviting BL to take part in his inventory of the Galapagos insects, for the organization of his first two expeditions, and for companionship in the field. Furthermore, we wish to thank N. Castillo, S. B. Peck, P. Schmitz, B. Sinclair, and E. Vilema for companionship and help in the field, Patricia Jaramillo (CDRS Herbarium) for sharing plant distribution information, and the Galapagos Conservation Trust (London, U.K.) for financing our visit to the BMNH in 2000.

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